HBJ A Harcourt Brace Jovanovich Publication

May 1982/$2.00

WEEDS TREES & TURF

The Journal of Landscape and Golf Course Design, Construction and Care Since 1962

Update on Horticultural Spray Oils

The Candlestick Park Story: A Communications Dilemma

Broadleaf Evergreens for Shaded Sites

GREEN INDUSTRY'S LARGEST CIRCULATION

Without a summer application of Dursban, big problems could pop up in fall.

While most insects emerge in spring, sod webworms and other varieties don't spring into action until late summer or fall. And even DURSBAN* insecticide—which gives you the longest residual action in the business—won't protect your customers' lawns from spring to fall.

That's why it's important to apply DURSBAN twice a year—on your first round for the early risers and later in the summer to get the late bloomers.

And considering the relatively low cost of DURSBAN, a two application insecticide program makes doubly good sense. After all, DURSBAN costs as little as 35¢ per 1000 sq. ft. application. A small price to pay for protection against the immeasurable costs of call-backs and shaken customer relations.

DURSBAN gets just about every bug you'll face, too: chinch bugs, sod webworms, armyworms, cutworms, you name it.

DURSBAN. Make sure *all* insects get a shot. Available in 2E and concentrated 4E formulations. See your Dow distributor. Also ask him about our new "DURSBAN delivers the goods" incentive program. Be sure to read and follow all label directions and precautions. Agricultural Products Department, Midland, Michigan 48640.

DURSBAN

Gets the jump on late emergers.

DOW

DOW Chemical U.S.A.

*Trademark of The Dow Chemical Company.

Ad No. 1906

Circle No. 114 on Reader Inquiry Card

WT&T

Repair and clean up after winter damage are May maintenance jobs.

MAY 1982/VOL. 21, NO. 5

Kezar Stadium, the predecessor to Candlestick Park, page 20.

Twenty years of John Deere lawn tractors, page 30.

Broader label proposed for horticultural oils, page 36.

20

Candlestick Park, A Communication Dilemma

Turfgrass Professor Kent Kurtz takes an in-depth look at the problems of San Francisco's much-publicized professional athletic field.

36

Horticultural Spray Oils For Tree Pest Control

Warren Johnson, Cornell professor of entomology, explains why one of nature's oldest pesticides might be safer, cheaper and more effective than modern chemicals.

Leucothoe, broadleaf evergreen for shade, page 44.

30

Cushman and John Deere Celebrate *WTT's* 20th Anniversary

Cushman and John Deere discuss their growth and development since *WTT*'s first issue in 1962.

44

Broadleaf Evergreens For Shaded Locations

Dow Gardens Horticulturalist Douglas Chapman picks pieris, leucothoe and daphne as prime candidates for plantings in woodsy locations.

DEPARTMENTS

Outlook ____ 4

Green Industry News ____ 6

Golf Update ____ 12

Landscape Update ____ 14

Government Update ____ 18

Vegetation Management ____ 54

Products ____ 58

Events ____ 64

Classified ____ 74

Advertiser Information ____ 76

Robert L. Edgell, Chairman; Richard Moeller, President; Lars Fladmark, Executive Vice President; Arland Hirman, Treasurer; Thomas Greney, Group Vice President; Ezra Pincus, Group Vice President; Larry Witchel, Group Vice President; Joe Bilderbach, Vice President; James Gherna, Vice President; George Glenn, Vice President; Harry Ramaley, Vice President.

WEEDS TREES & TURF (ISSN 0043-1753) is published monthly by Harcourt Brace Jovanovich Publications. Corporate and Editorial offices: 757 Third Avenue, New York, New York 10017. Advertising offices: 757 Third Avenue, New York, New York 10017 and 111 East Wacker Drive, Chicago, Illinois 60601 and 3091 Maple Drive, Atlanta, Georgia 30305. Accounting, Advertising Production and Circulation offices: 1 East First Street, Duluth, Minnesota 55802. Subscription rates: $15 per year in the United States; $18 per year in Canada. All other countries: $40 per year. Single copies (prepaid only): $2 in the U.S.; elsewhere $4.50; add $3.00 for shipping and handling per order. Second class postage paid at Duluth, Minnesota 55806 and additional mailing offices. Copyright © 1982 by Harcourt Brace Jovanovich, Inc. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the publisher. Microfilm copies of articles are available through University Microfilms, International, 300 N. Zeeb Road, Ann Arbor, Michigan 48106.

POSTMASTER: Send address changes to WEEDS TREES & TURF, P.O. Box 6198, Duluth, Minnesota 55806-9898. HBJ A HARCOURT BRACE JOVANOVICH PUBLICATION

Subdue.

Controls Pythium blight and damping-off.

No other fungicide works as well as Subdue® against Pythium damping-off and blight because only Subdue has two-way action against these diseases.

First, Subdue gives you systemic control that protects grasses from the inside out. Second, it works in the soil to control Pythium by contact action. Two-way action that keeps turf healthy.

In established turf, Subdue is an ideal preventative treatment for Pythium blight. Plus in newly seeded or overseeded turf, you get protection from Pythium damping off and blight.

Subdue provides effective control for 10-21 days. Longer residual control than other Pythium fungicides. So Subdue can help you reduce application trips and labor costs. But just as important, Subdue fits your total program because it's compatible with most other fungicides.

Subdue gives you protection like you've never had. Subdue, the only fungicide for Pythium with two-way action.

CIBA–GEIGY

© 1982 Ciba-Geigy Corporation

Circle No. 110 on Reader Inquiry Card

WT&T

OUTLOOK

By Bruce F. Shank, Executive Editor

Urban forestry may shift to arborist

Never has the tree care market been in such a volatile position. A potential cutback in urban forestry funding will place huge responsibility on the shoulders of commercial arborists in the 80's.

It is possible the full weight of regional tree emergencies, reforestation and maintenance of both public and private urban trees will fall on the commercial arborist within the next five years. The question is whether a market that has not experienced rapid growth in the past decade will be able to take on the load as quickly as it must.

Richard Pardo, director of programs for the American Forestry Association, warns the outlook for Forest Service state and private assistance programs is grim, with a budget cut of 25 percent proposed for 1983. In the March issue of *American Forests* Pardo writes, "Funding (in FY '83) for urban forestry and technology implementation will be eliminated, and planning assistance to states will be reduced by almost two-thirds."

Although the Forest Service is not the only source of government funding to tree programs, it has supplied much of the research we now use and was planning to push hard on urban forestry prior to the cuts.

All this comes at a time when research into low maintenance trees and tree health is starting to pay off. The solutions to urban stresses on trees are being found just at the time when the financial plug may be pulled. It therefore becomes the task of the commercial arborist to educate the public and implement this new technology.

The commercial arborist already has a portion of municipal tree work. Larger arborists have made this type of work top priority, along with right of way clearance. But the cities they work for are going by Forest Service recommendations to a great degree. The Agricultural Extension Service agent occasionally fills in where the Forest Service misses. But the Extension Service may also experience cutbacks equal to the Forest Service.

The landscape architect may find his advise needed more in the 80's by municipalities seeking to revitalize older neighborhoods where original plantings have faded by insect, disease, and construction related losses. But much of the advise required will be for jobs too small to warrant a landscape architect's fee.

Some large cities have the advantage of a city forester. Smaller cities in the suburbs will have the greatest need for the commercial arborist's help.

It would be wise for the arborist to get acquainted with landscape architects in their area who have done municipal plans before. LA's have regular contact with landscape contractors, but not arborists. The arborist must educate the architect to his superior capability regarding urban tree maintenance. Arborists who have shunned planting for the more attractive maintenance business, might consider limited planting to meet the needs of city tree programs.

Flexibility, service, and salesmenship will give the arborist markedly expanded potential in the 80's. **WTT**

WT&T

Executive Editor
Bruce F. Shank, New York

Associate Editor
Thomas Paciello, New York

Assistant Editor
Robin Richards, New York

Publisher
Dick Gore, Atlanta

Group Vice President
Tom Greney, Chicago

Group Publisher
Robert Earley, New York

Production Manager
Mary Lindskog, Duluth

Production Supervisor
Marilyn MacDonald, Duluth

Graphic Design
Dave Johnson, Duluth

Circulation Manager
Kristine Benike, Duluth

Directory Coordinator
Patty Rusch, Duluth

Reader Service Manager
Gail Kessler, Duluth

Promotion Director
Linda Winick, New York

OFFICES

ATLANTA
3091 Maple Drive
Maple Center One Building
Altanta, GA 30305
(404) 233-1817

NEW YORK
757 Third Ave.
New York, NY 10017
Editorial: (212) 888-2563 (or 2892)

CHICAGO
111 East Wacker Drive
Chicago, IL 60601
(312) 938-2344

SEATTLE
1333 N.W. Norcross
Seattle, WA 98177
(206) 363-2864

DULUTH
120 West Second Street
Duluth, Minn. 55802
(218) 727-8511

MARKETING REPRESENTATIVES

James R. Brooks
Atlanta (404) 233-1817

Dick Gore
Atlanta (404) 233-1817

Ron Kempner
Atlanta (404) 233-1817

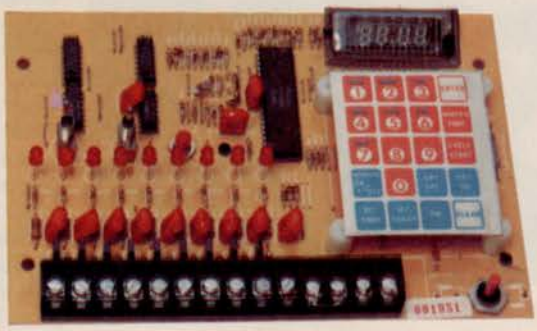
Robert Mierow
Seattle: (206) 363-2864

member

Member; American Business Press, Business Publications Audit, National Golf Foundation, American Sod Producers Association, Associated Landscape Contractors of America, National Landscape Association, Horticultural Research Institute.

The Most Advanced Line of Solid State Controllers

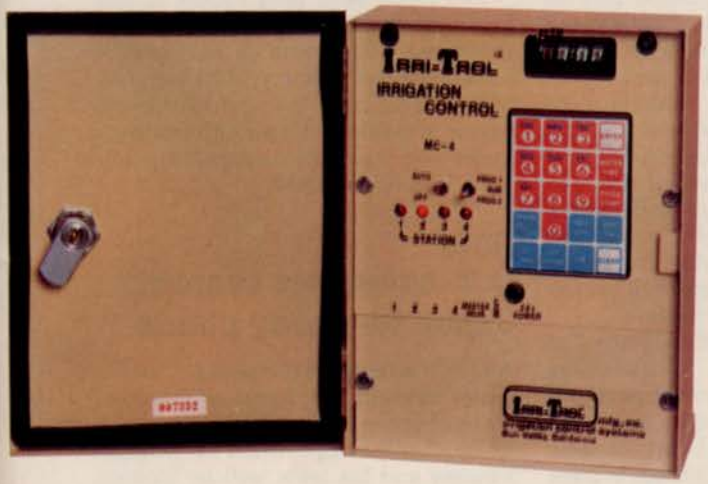
The MC-4, MC-8, MC-12, MC-18, MC-24, MC-30 & MC-36

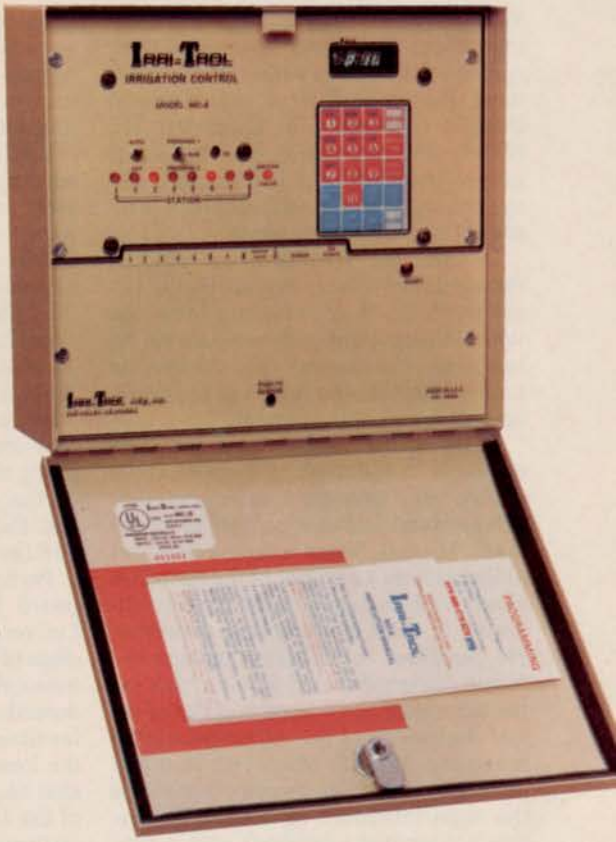


FEATURES:

- Proven Reliability
- Versatility for all Irrigation Needs
- Simple and Easy to Program
- Split Second Accuracy
- Weatherproof Steel Case, UL Approved for Outdoor Installation
- One 9 Volt Battery Keeps Program in Memory During Temporary Power Failures
- Automatically Activated Safety Back-up Program
- True Dual Programming
- Master Valve or Pump Start Station
- Bright Digital Display for Daylight Visibility
- Individual Station Light, Indicating the Watering Valve(s)

The Computerized Irrigation System





IRRI-TROL mfg., inc.
27940 Beale Court • Valencia, CA 91355 • (805) 257-2333
Telex: 662600 IRTROLMFG VALE

Circle No. 119 on Reader Inquiry Card

GREEN INDUSTRY NEWS

TURF

Purdue hosts MRTA conference

Bill Lyons and Harry Wilcox *met at MRTA Lyons' traditional conference cheese bar*

Turf managers from Indiana and adjacent states took three days out of their spring schedules to gather at the Midwest Regional Turf Conference at Purdue University in Lafayette, IN. Nearly 450 association members and guests listened to a full program of speeches, traded information and caught up on industry news.

Dr. Marion Baumgardner opened the seminars with an update on the latest methods in monitoring land use with multispectral scanners located on satellites. He started the conference with a look into the future of land conservation and management.

Bringing the session back down to earth, Dr. A.J. Powell of the University of Kentucky gave the first in a number of anecdotal lectures on turf management. His talk began a theme that prevailed among a number of the speeches given: turf managers must have confidence in their training and expertise. He described the inherent tension between the uneducated golfer's high expectations for the course and the physical limitations of the experienced turf manager. Powell observed that the pressure exerted by clients often sways the superintendent to turn to expensive convenience products with a preventative purpose that is not always needed. Powell encouraged the experts to use their training and experience in recognizing the need for certain treatments rather than spending time and money on unnecessary products and activities.

Setting quality goals for greens according to the type player that uses it will prevent the superintendent or owner from creating a course that requires more nitrogen application and maintenance than is possible within the financial constraints of the players. Pointing this out, Dr. John Hall of Virginia Polytechnic Institute, said this limitation should be taken into account when balancing the level of nitrogen that can be afforded for golf greens, along with the species of grass, the age of the green, the mowing frequency and the length of the growing season and the source of the nitrogen.

Participants in the golf audience also heard Dr. Reed Funk, from Rutgers University, on the improved performance of fine and tall fescues and other new cultivars. Purdue's Dean Mosdell, described the trail of nitrogen from fertilizer to forms usable by plants, and the losses involved from leaching, erosion and crop removal. James Vaccaro of the Dow Chemical Co., gave a thorough outline of techniques for optimum protection when working with pesticides. Howard Kaerwer of Northrup-King Co., discussed the logistics of seed production and promotion.

A concurrent session on lawn care covered the selection of sources of nitrogen for liquid lawn care with Richard Rathjens of the Davey Tree Co., and observations on nitrogen sources from Jim Mello of Nice 'N Green. Dr. Ray Freeborg of Purdue, discussed his research on preemergence herbicides and growth regulators. The lawn care seminars ended with a panel discussion with Jeff Lefton of Chemlawn, A.J. Powell, Dr. Daniel Potter of University of Kentucky and John Hall.

Separate sessions on athletic turf and public golf course management were offered on Tuesday. John Souter of Stirling, Scotland brought word of his success with a technique of soil warming using subteraneous warm water pipes. Dr. Bill Daniel of Purdue, shared his research accomplishments in drainage and the Enka-Mat synthetic turf base.

The association paid tribute to Bill Lyons of Canal Fulton, OH, for the many years and ideas he has contributed to the turf industry, at its banquet. MRTA also took the opportunity to honor president Gene Johannings-meier and welcome next year's president, Kim Mullendore.

TREES

U.S. scientists search Japan for hardy plants

An Ohio scientist is preparing to lead a group through the forest and coastal areas of Japan in an exhaustive search for hardier species of trees. Dr. Makoto Kawase and his team will be looking for varieties of woody trees and shrubs with potential for introduction in the U.S.

The exploration will take place on the island of Hokkaido, the site of similar more limited earlier expeditions.

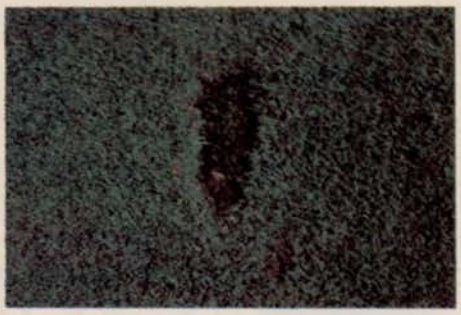
Continues on page 8

Aronimink Golf Club uses 50/50 Mix of Penncross and Penneagle to save water...

Aronimink Golf Club, Philadelphia, PA

50/50 Mix on Number 9 Fairway

Penncross germinating in divot



Proof that two "Halfs" make a better hole

PENNCROSS

1. Increased hybrid vigor
2. Widely Adapted
3. Agressively Competes
4. The best Bentgrass available for over 25 years
5. Proven performance throughout the world

"The Old Standby"

For the name of your nearest Penncross/Penneagle dealer, call or write:

TEE-2-GREEN CORP.

P. O. Box 250
Hubbard, OR 97032
Toll free: 1-800-547-0255
TWX: 510-590-0957

PENNEAGLE

1. Dark green color
2. Upright, tighter growth
3. Lower cutting (7/64" for tournament play)
4. More economical
5. Better disease resistance
6. Tighter growth habits

"The New Standard"

PENNCROSS BENTGRASS

Ten minute slide presentation available on loan. Call or write:

Tee-2-Green Corp.
Information Coordinator
1349 Capitol Street NE
Salem, Oregon 97303
503/363-1022

PENNEAGLE

Circle No. 138 on Reader Inquiry Card

Having grown up there, Dr. Kawase is familiar with the woody flora of the area.

In preparation for the project, Kawase has published a review of all the flora growing in the exploration areas. The list was reviewed by scientists and nurserymen all throughout the north central U.S. who selected the species they felt would be beneficial in this country. The team hopes to find species which have improved flower quality, better foliage and greater resistance to winter weather than the ones now being grown.

Joining Kawase on the trip, will be S.G. March, a supervisory horticulturist for the U.S. National Arboretum in Washington D.C. and Frederick G. Meyer of he National Arboretum's Herbarium.

INSECTS

Greenbug overwintering confirmed by Niemczyk

Greenbug eggs located last November in Dayton and Cincinnati, OH, have proven to be viable when placed at room temperature in March, according to turf entomologist Harry Niemcyzk of the Ohio Agricultural Research and Development Center, Wooster, OH.

Harry Niemcyzk

Previously known to overwinter in Kentucky, Niemczyk and others speculated (*WTT*, June 80) that the eggs overwintered or the adult migrated northward. Both eggs and turf plugs containing eggs were brought indoors by Niemczyk in March to test for viability. In both cases, the eggs hatched quickly. This confirms the speculation that the egg overwinters and does not migrate.

Large numbers of greenbug eggs (Schizaphis graminum) have been found on lawns in the Dayton and Cincinnati area. Further details on this finding will appear in June *Weeds Trees & Turf*.

NURSERY

Computer supply info available

A computerized catalog system will soon be available to nursery suppliers and buyers alike to keep them informed of their own inventories as well as the availability and prices of current inventories in a region or a state. The L.I.S.T. System (Landscape Information Teleprompt Service) is offering a variety of reports providing industry members with comprehensive infor-

EMBARK® Plant Growth Regulator [PGR]

WHAT

A solution to suppress turf growth for up to 8 weeks.

EMBARK PGR can significantly reduce or even eliminate mowing requirements for 5 weeks on bermudagrass, and up to 8 weeks on grasses such as Kentucky and annual bluegrass, fescues, perennial ryegrass, quackgrass and many others.

Unsightly seedheads will also be suppressed or eliminated.

WHERE

A work-saver on low-maintenance grasses, hard-to-mow and trim areas.

Put EMBARK PGR to work along highways, around industrial parks, at cemeteries and wherever else you want a uniform appearance of grass with less mowing.

Also reduce mowing hazard and time on slopes, around headstones and other hard-to-mow areas. Grass remains viable and green.

mation on nursery stocks to improve their operating efficiency.

The L.I.S.T. System offers inventory statements to suppliers; purchase reports for buyers that list the suppliers, quantity and prices of a given material; estimation reports provide the total number of suppliers, quantity and prices of a material in that area; condensed reports have the basic data of both the supplier and estimation reports; buyer and supplier resume reports give the business backgrounds of each nursery and primary buyer listed and a monthly compilation of the previous reports.

The L.I.S.T. is the creation of Robert McDonald, an alumnus of the landscape contracting program at Mississippi State University and formerly with Gustin Gardens. McDonald is joined by John Cote as vice president of sales.

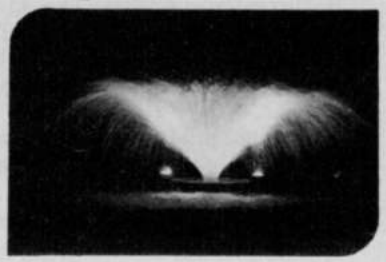
The charge to the suppliers for the use of the system will be on a per line-item basis. Buyers will pay a membership fee and then be charged on the basis of the amount of use they require.

Based in Columbia, MD, the system is operated on the computer of the American Management Systems. According to McDonald, this database

Continues on page 12

OTTERBINE

Spray Sculpture Floating Fountains. Now you can clean up ponds and lakes naturally.



By day or night, these floating fountains help keep your water clean and odor-free naturally, and create a sparkling spray display that enhances the beauty of any surrounding. They are available in a variety of sizes and spray pattern designs, with optional Fountain-Glo lights.

Otterbine Creates Beauty . . . By Solving Problems

OTTERBINE AERATORS

BAREBO, INC.

RD 1, P.O. Box 217, Emmaus, PA 18049 215-965-6018

Circle No. 104 on Reader Inquiry Card

Keeps turf as trim as the budget... easily.

WHY

One mowing instead of eight saves time, labor and budget

With EMBARK PGR, mow once instead of 8 times. You could start saving after you eliminate the second mowing. Also frees up the crew to get more jobs done with the same people in the same time.

If you'd like to calculate your specific mowing costs and potential savings...

Ask for your free guide

HOW

Applies easily with standard spray equipment

Apply anytime turf is actively growing. Use a range of spray equipment from truck mounted booms to a backpack unit.

Product Application Handbook is available from your distributor. Anyone on the job can also call toll-free for answers on equipment calibration.

For your free Mowing Costs Guide and toll-free call card contact your dealer or Agricultural Products/3M, 223-6SE, St. Paul, MN 55144.

EMBARK is a reg. TM of 3M.

3M Hears You.

3M

Circle No. 139 on Reader Inquiry Card

GOLF UPDATE

GCBA directory and yearbook available

The 1982 directory and yearbook of the Golf Course Builders of America is currently available. The 42-page, pocket-size publication includes information on general and subcontractors who build the nation's golf courses, identifies the courses they have constructed and tells of their general experience in building, reconstructing and renovating golf courses.

The 1982 publication feature articles on golf course drainage problems by F.J. Palecek, market manager of Advanced Drainage Systems, Columbus, OH; weed control by Dr. Paul Sprankle, agronomist for Monsanto Agricultural Products Co., St. Louis, MO; and the story of the National Golf Foundation by Executive Director Don Rossi.

For a free copy write: Golf Course Builders of America, Suite 638, 1001 Connecticut Avenue, Washington, DC 20036.

Career center teaches course maintenance

The Wilco Area Career Center, Romeoville, IL, believes in giving their students hands-on experience in their courses. When they decided to start a horticulture program with emphasis on turf care and golf course maintenance, it was only natural to build their own horticulture training facility on a few acres of open field behind the center. In two years the resulting facility included a 12-ft. deep pond, two nurseries (valued at $10,000), 16 turf test plots, a tractor driving range and a three-hole golf course.

Students in the Wilco Horticulture Program receive practical training in the operation of over 30 pieces of maintenance equipment. "What we have here is a program heavy in skill development and light in textbook work," said David Manning, horticulture instructor. Seventy-six students are presently enrolled in the horticulture program. They are taught the basic entry-level skills needed in the horticulture industry with an emphasis on turf care and golf course maintenance. After being certified by the center (in a one- or two-year program), graduates move on to full-time employment or advanced educational training.

According to Assistant Director Lyle Honnold, the Wilco Center is supported by local, state and federal funds. The program costs the students nothing. The golf course itself was constructed by the Wadsworth Co., Plainfield, IL, with much of the labor and equipment provided at no charge. A $7000 manual irrigation system was installed and $2000 worth of grass seed planted on the three-hole layout. Students took part by helping to clear and refine the area. The Midwest Association of Golf Course Superintendents loaned some maintenance equipment. One valuable piece of equipment, a used five-gang mower and tractor, was donated by a local superintendent.

The golf course has turned out to be a public relations asset to the career center. Players are given an honorary membership card for golf and fishing privileges at the Wilco Area Career Center Land Laboratory and are asked to give "continued support of vocational education." Wilco's bag tags and scorecards also inform the players that they are playing on a "student developed, maintained and operated golf course."

"We've spent the last four years further developing each aspect of the horticulture program so that every pupil is given a practical, hands-on training experience," said Manning. "The program goes year-round now with several of our students now employed on golf maintenance crews, in nurseries and in greenhouses."

In the future, Manning and his assistant James Phelps want to vary the maintenance practices on different holes (and add some more) and expand the nursery operation. In these endeavors the students will be guided by Manning and Phelps and a 20-plus member Horticulture-Agriculture Advisory Council.

NEWS *from page 11*

gives the clients a secure backup system and programming expertise.

Suppliers who wish to be on the L.I.S.T. should contact McDonald with current information on their available materials and prices. Buyers must supply a list of materials being searched for and should begin receiving service as soon as there is a bank of suppliers on the computer.

PESTICIDES

Pesticide breakdown may lessen effectiveness

Studies are now showing that insect resistance may not always be the reason that some pesticides loose their effectiveness over time. According to Alan Felsot of the University of Illinois, erratic performance may occur because the pesticide is broken down by enzyme or microbial activity.

"We think that certain microbial organisms in the soil are able to use the pesticide as an energy source," explained Felsot. With the chemical as an additional source of energy, the microbes thrive and multiply rapidly. Consequently, the more pesticide that is added to the soil, the faster it is degraded.

Reports have been made of the herbicide Eradicane and the insecticide diazinon breaking down quickly once applied to the soil. These problem seem to occur primarily in soils with a pH above 7. Yet, scientists cannot accurately predict what types of soils foster this reaction.

Controlled release chemical formulations and rotation of chemical classes may remedy the situation. Chemical extenders are also effective in keeping pesticides in the soil longer in the laboratory. Scientists must discover the specific causal organisms or enzymes before the problem can be fully solved.

TURF

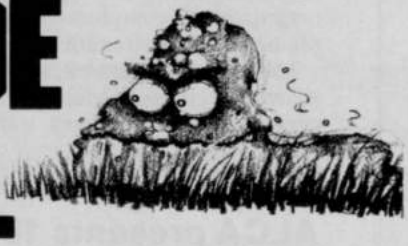
NY landscape conference a hit

A one-day conference held by the Professional Turf and Landscape Association in Nyack, NY was a tremendous success according to Dan Antonecchia, the liason officer. The meeting featured 76 trade exhibitors as well as a program

Continues on page 14

NORTHRUP KING PRESENTS

THE HEAVY TRAFFIC, CLEAN MOWING, SALT TOLERANT, DISEASE FIGHTING, SUN-TO-SHADE GRASS SEED.



No one grass seed combines every characteristic for every type of turf. That's why Northrup King research has developed a complete line of Medalist Turf Products to meet specialized professional needs.

MEDALIST TURF PRODUCT	MAJOR AREAS OF USE	SPECIAL FEATURES
Athletic Pro Mix	High maintenance athletic turf	Both are well suited for new seeding or overseeding. Fast establishing, excellent traffic tolerance, and rapid recovery. Provides good footing.
Athletic Pro II Mix	Low to moderate maintenance athletic turf.	
Boulevard Mix	Any area with high pH (roadsides, sidewalks, boulevards, beachfronts, etc.)	Contains both "Fults" *Puccinellia distans* and Dawson red fescue which thrive on high saline or alkaline soils. Performs at low to high fertility levels.
Landscape Pro Mix	School grounds, cemeteries, golf course roughs, lawns	Fast establishing. Adapts to broad range of conditions and management levels. Low to moderate fertility requirements.
Overseeder II Mix	Fairways, tees, athletic fields	Fast establishing, traffic tolerant, disease resistant, penetrates compacted soil.
Overseeder III Mix (Formerly Medalist North Mix)	Fairways, tees, cart paths, wear areas	Long term quality in high traffic areas. Clean mowing and disease tolerant.
Premium Sod Blend	Commercial sod producers	Fast establishing, exceptional dark green color, shade tolerant, superior disease resistance.
Special Park Mix	Parks, commercial developments, lawns	Low fertility tolerance, shade tolerant, adapts to wide range of soil types.

Ask your Northrup King distributor about the Medalist Turf Products for your needs. Or write Northrup King Medalist Turf Products, P.O. Box 959, Minneapolis, MN 55440.

MEDALIST TURF PRODUCTS

Circle No. 129 on Reader Inquiry Card

LANDSCAPE UPDATE

Landscape architects join forces

The American Institute of Landscape Architects (AILA) and the American Society of Landscape Architects (ASLA) have unified their organizations. The two organizations together will be known as ASLA.

As a result of the unification ASLA now represents more than 6000 landscape architects. "The unification of these two societies represents a major step forward for landscape architecture," said ASLA President Calvin Bishop. "We can now offer one solid professional representative for all landscape architects."

Former AILA President Robert Cardoza added that the unification is "the best thing that has ever happened to landscape architecture—an action that has been long overdue. With more people, numbers and resources, many more goals will be reached. Rather than having two organizations complementing each other's weaknesses, we'll be complementing our strengths."

Under the agreement, all AILA members were offered the option to transfer their membership to ASLA in the equivalent membership category. All AILA Fellows transferred their fellowship designation to ASLA.

ALCA presents 10 Grand Awards

The Associated Landscape Contractors of America (ALCA) presented its 1981 Environmental Improvement Awards at its annual meeting in Palm Springs, CA. Ten Grand Awards in six categories were presented.

Interior Installation: (1) Interior Landscape Design, San Jose, CA, for San Francisco Executive Park; and (2) Tropical Plant Rentals, Prairie View, IL, for Town Square Mall. *Commercial Landscape Contracting:* (1) Century Landscape Contractors, Agoura, CA, for UCLA Westwood Plaza South Mall and Parking Terrace; and (2) Chapel Valley Landscape Co., Woodbine, MD, for Mobil Marketing and Refining Headquarters. *Design/Build:* (1) Allen Keesen Landscape, Denver, CO, for The Kooi Residence; and (2) Alley Pond Nurseries, Melville, NY, for The Boroff Residence. *Interiorscape Maintenance:* The Plant Place, Philadelphia, PA, for Philadelphia Stock Exchange Building Atrium. *Landscape Maintenance:* Brickman Industries, Trevose, PA, for E.R. Squibb and Sons Headquarters. *Residential Landscape Contracting:* (1) Schlick Landscaping, Greenlawn, NY, for The Fasano Residence; and (2) Green Brothers Landscape Co., Smyrna, GA, for The McGee Residence.

In addition the Grand Awards, ALCA presented 13 Merit Awards and 12 Awards of Distinction.

Four grab NLA Superior Awards

The National Landscape Association handed out four Superior Awards and eight Certificates of Merit at its 12th Annual Residential Landscape Awards Program held at the Landscape/Garden Center Management Clinic in Louisville, KY.

There was one Superior Award winner in each of four categories. *Single Family Residence:* Theodore Brickman Co., Long Grove, IL. *Entrance:* Dundee Nursery and Landscaping Co., Plymouth, MN. *Active Use:* Alley Pond Nurseries, Melville, NY. *Passive Use:* Green Brothers Landscape Co., Smyrna, GA.

Certificates of Merit were presented to: Oakland Nursery, Columbus, OH, GWSM, Pittsburgh, PA; Steven Dubner Landscaping, Dix Hills, NY; and Green Brothers Landscaping Co., Symrna, GA (5).

NEWS *from page 12*

that dealt with subjects from lawn management to pruning.

Designed to update interested persons in the maintenance and construction of lawn and landscape settings in residential, commercial and park situations, the event was mobbed with 1150 attendants. Unfortunately, the facilities could not accomodate that many participants and some people were unable to get into the sessions. The management is now looking into the possibility of moving next year's conference to a larger location.

Some of the most popular educational sessions were those on bedding plants by Ann Reilly, small engines by Bud Muser and Tom Nally's basic landscaping talk.

TURFGRASS

Lind moves over to Garfield Williamson

Seed broker Bill Lind has become the business manager for Garfield Williamson Co., a supplier of turfgrass and lawncare products for professional and retail accounts in the Northeast. In this position, Lind is responsible for financial planning, operations and general business.

Bill Lind

Formerly with John Zuelzer & Sons, Lind is a graduate of State University of New York Agricultural and Technical School and a veteran of the Marine Corps.

Continues on page 18

3 GOOD WAYS TO IMPROVE YOUR QUALITY, PRODUCTION, SERVICE AND PROFIT WITH BROUWER!

1. NEW BROUWER HITCH-HIKER

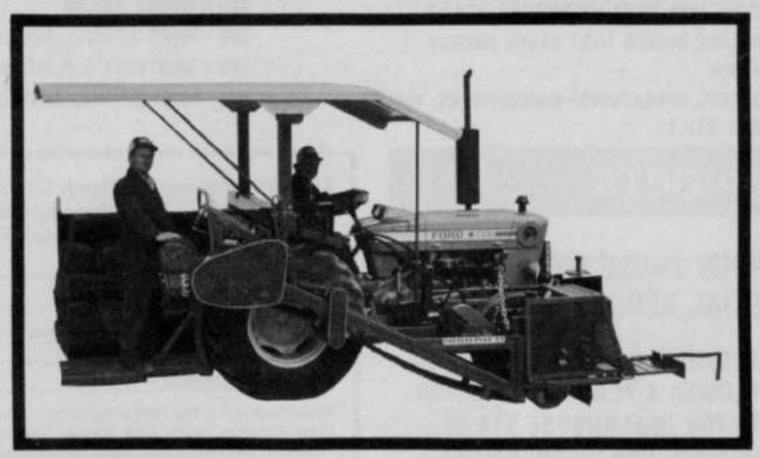
Another Brouwer innovation in material handling

- Simple, safe operation
- Very lightweight design
- Excellent performance on all terrain
- Quick hook-up and release to any truck
- 8" side shift for tight loading
- High transport clearance
- 19 HP Diesel Engine
- Mechanical Drive System
- Immediate Pallet Return

2. BROUWER ECONOMY HARVESTER

- Operate off uncut turf
- A more uniform cut
- Less down time
- Less top soil removal
- Available in 15, 16, 18 and 24 inch widths and choice of pallet sizes
- Cut, Roll, Slab or Fold 24 hours a day, wet or dry weather, all sod, all conditions.

Top Turf men around the world use Brouwer Harvesters to assure top profit.



ROLL

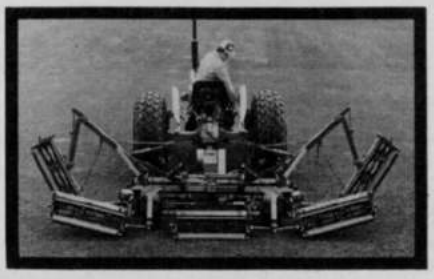
SLAB

FOLD

3. BROUWER PTO MOWERS

FEATURING HYDRAULIC LIFT

WRITE FOR FREE BROCHURES.



Brouwer PTO Mowers for economy, reliability and cutting the toughest grass.

- Easy to transport
- Smooth cut at a low cost
- Lightweight, high-stress steel frame
- Simple "no-wheel and gear" PTO Drive
- No wheel tracks
- Track remover available
- Yours in 3, 5 and 7 gang combinations

BROUWER

The Turf Equipment People

Brouwer Turf Equipment Limited, Woodbine Ave., Keswick, Ontario, Canada L4P 3E9 Tel: (416) 476-4311

"CALL OR WRITE US FOR THE DEALER NEAREST YOU"

Circle No. 106 on Reader Inquiry Card

A wealth of instructional and technical material designed to make your job easier

Bookstore

101, 015 - ADVANCES IN TURFGRASS PATHOLOGY $27.95 hardcover, $18.95 paperback

340 - CONSTRUCTION DESIGN FOR LANDSCAPE ARCHITECTS $24.50

345 - COST DATA FOR LANDSCAPE CONSTRUCTION 1981 $24.95

410 - DISEASES & PESTS OF ORNAMENTAL PLANTS $26.50

660 - DISEASES OF SHADE TREES $23.50

610 - DISEASES OF TURFGRASS $30.00

795 - FIRST AID MANUAL FOR CHEMICAL ACCIDENTS $16.50 paperback

440 - FUNDAMENTALS OF ENTOMOLOGY & PLANT PATHOLOGY $22.00

450 - GARDENING IN SMALL PLACES $7.95

455 - GRAFTER'S HANDBOOK $16.95

480 - GREENHOUSE MANAGEMENT FOR FLOWER AND PLANT PRODUCTION $15.35

490 - GREENHOUSE OPERATION & MANAGEMENT $19.95

670, 680 - GUIDE TO TREES $19.95 hardcover, $8.95 paperback

350 - HANDBOOK OF LANDSCAPE ARCHITECTURAL CONSTRUCTION $48.50

360 - HOME LANDSCAPE $18.95

510 - HORTUS THIRD $99.50

690 - INSECTS THAT FEED ON TREES & SHRUBS $42.50

530 - INTERIOR PLANTSCAPING $28.50

540 - INTRODUCTION TO FLORICULTURE $29.50

335 - LANDSCAPE DESIGN THAT SAVES ENERGY $9.95 paperback

370 - LANDSCAPE OPERATIONS: MANAGEMENT, METHODS & MATERIALS $18.95

380 - MANUAL OF WOODY LANDSCAPE PLANTS $19.00

545 - MODERN WEED CONTROL $19.50

665 - OXFORD ENCYCLOPEDIA OF TREES OF THE WORLD $24.95

780 - PARK AND RECREATION MAINTENANCE MANAGEMENT $18.95

355 - PERSPECTIVE SKETCHES $19.50

390, 395 - PHOTOGRAPHIC MANUAL OF WOODY LANDSCAPE PLANTS $22.00 hardcover, $14.60 paperback

365 - PLAN GRAPHICS $21.00

700 - THE PRUNING MANUAL $14.95

790 - RECREATION PLANNING AND DESIGN $31.95

375 - SITE DESIGN AND CONSTRUCTION DETAILING $24.00

730 - TREE CARE $8.95

740 - TREE FARM BUSINESS MANAGEMENT $20.50

750 - TREE IDENTIFICATION $9.00

760 - TREE MAINTENANCE $29.95

385 - TREES FOR ARCHITECTURE AND THE LANDSCAPE $11.95

770 - TREE SURGERY $18.95

650 - TURFGRASS MANAGEMENT $17.95

630 - TURFGRASS: SCIENCE & CULTURE $23.95

640 - TURF IRRIGATION MANUAL $22.95

620 - TURF MANAGEMENT HANDBOOK $14.65

110, 120 - TURF MANAGER'S HANDBOOK $23.95 hardcover, $18.95 paperback

565 - WEEDS $32.50

560 - WEED SCIENCE $24.00

570 - WESTCOTT'S PLANT DISEASE HANDBOOK $34.50

580 - WYMAN'S GARDENING ENCYCLOPEDIA $29.95

CLOSEOUTS

ORDER THESE TITLES AT SPECIAL REDUCED PRICES!

420 - EXOTIC PLANT MANUAL $32.00

430 - FLOWER & PLANT PRODUCTION IN THE GREENHOUSE $13.60

460 - GREENHOUSE ENVIRONMENT $21.20

470 - GREENHOUSE GROWER $12.40

500 - HORTICULTURAL SCIENCE $18.80

780 - PARK AND RECREATION MAINTANENCE MANAGEMENT $16.00

550 - PLANT PROPAGATION $21.00

400 WESTERN HOME LANDSCAPING $6.75

Mail this coupon to: Book Sales
Harcourt Brace Jovanovich Publications
One East First Street, Duluth, MN 55802

Name _____

Address _____

City _____ State _____ Zip _____

Signature _____ Date _____

Phone Number _____

Please send me the following books. I have enclosed a check* for the total amount.
Please charge to my Visa, Master Card or American Express (circle one)
Account Number _____ Expiration Date _____

ORDER NUMBER	QUANTITY	PRICE	TOTAL PRICE

*Please add $3.00 per order plus $1.00 per additional copy for postage and handling.

_____ (postage & handling)

Please allow 6-8 weeks for delivery
Prices subject to change.
Quantity rates available on request

Total Enclosed _____

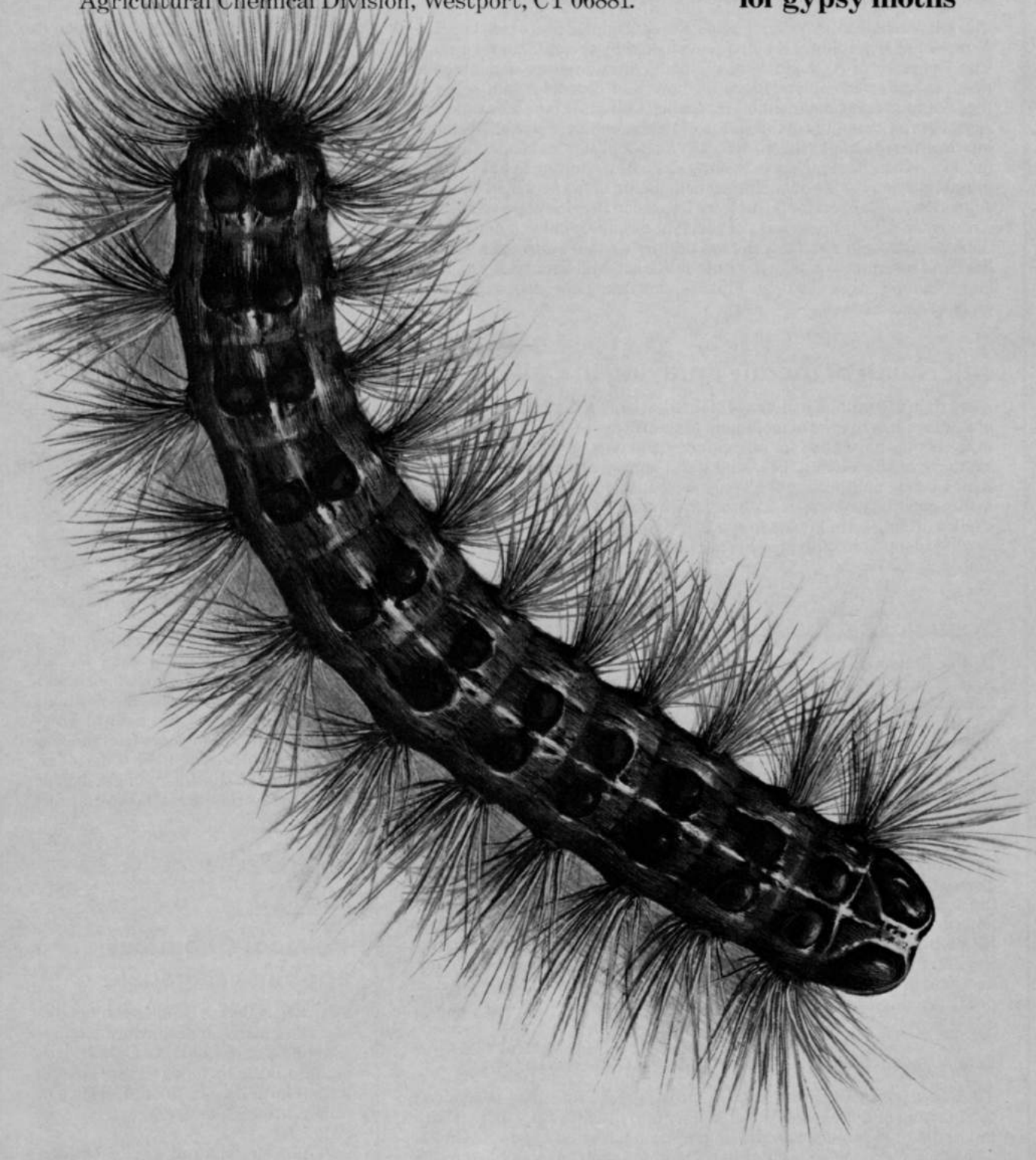
WTT 52

Gypsy moths don't have to defoliate America's trees.

Imidan® insecticide has been controlling them for years, and preventing damage from elm spanworms, spring cankerworms, birch leaf miners and other insects as a bonus. Spray Imidan following label directions. Low in toxicity to humans, pets and wildlife. Above all, it's safe to trees. Stauffer Chemical Company, Agricultural Chemical Division, Westport, CT 06881.

Stauffer CHEMICALS

Imidan®
for gypsy moths



Circle No. 146 on Reader Inquiry Card

GOVERNMENT UPDATE

BY WILLIAM HOFFMAN

Extension service future under review

The mission of the Extension Service, the educational arm of the U.S. Department of Agriculture, is being reevaluated by several federal groups. The Secretary of Agriculture has appointed an advisory committee to make specific recommendations on how best Extension can serve in times of increasing competition for the tax dollar. At the same time, the Agriculture Committee of the House of Representatives started oversight hearings for the same reason—the first look at the entire cooperative extension system (federal, state, county) since its beginning in 1914. While initial testimony at the committee meetings and at the oversight hearings echoed strong support for the present Extension Service there was an undercurrent that, in these times of short funds and trouble among the nation's farmers and ranchers, the top priority was to return the system to the rural community and away from the urban and suburban programs began in the last decade or so. Final reports from both groups should be on hand late this year.

Aftermath of medfly spraying in California

More than $10 million in damage claims have been filed against the state of California in the use of malathion to control the Medfly last year. Most of the claims have been for automobile paint damage but many are also claiming health effects. The state did a survey of hospital emergency rooms inside and outside the spray area and found no indications that health complaints increased during the spraying. They are interested in studies of long-term effects in the San Francisco Bay area where there were as many as 15 sprayings, but the California legislature has refused to authorize the funds.

Pesticides uses for nursery industry delayed

In the January issue, I reported that the Environmental Protection Agency, working with the American Association of Nurserymen, National Forest Products Association and the Society of American Florists, had developed a system that would give the nursery industry quicker access to many of the new pesticides. EPA proposed that certain uses of pesticides registered for use on food crops and used on non-food nursery sites would not be inconsistent with the labeling even though the sites were not on the labeling.

The Association of American Pesticide Control Officials (AAPCO), representing the state regulatory agencies, opposed this plan. AAPCO was concerned that it would result in the breakdown of the legal soundness of the label and would be very difficult to enforce. They also felt that the nursery industry had not made use of state local need (24-c) registrations to obtain the needed pesticides. In light of this vigorous opposition, EPA withdrew its backing but agreed to publish the plan in the Federal Register for all to comment on. It will be late summer this year before any decisions are made so the industry will have to use appropriately labeled pesticides this growing season.

New pesticides laboratory in New Jersey

The New Jersey Department of Environmental Protection announced the opening of a 25,000-sq. ft. laboratory and office facility to deal with environmental problems in the field of pesticides and toxic substances. The laboratory, located in suburban Trenton, was made possible through a three year grant from EPA. It is equipped with the latest in chemical instrumentation and will offer its analytical capabilities to federal, state and local agencies.

NEWS *from page 14*

EQUIPMENT

Turnbull named to Toro board

Dale W. Turnbull has been made the tenth member of the Toro Company's board of directors. President of Towmotor Corporation and vice president of Caterpillar Tractor Company, he will serve in this position until December of 1982, when he will stand for election at the annual meeting.

Dale W. Turnbull

Turnbull joined Caterpillar as a trainee after graduating from Kansas State University in 1950. He then held a series of sales and marketing positions before becoming a president of Towmotor in 1977. Two years later, he was elected vice president of Caterpillar. Towmotor is a subsidiary of Caterpillar which manufacture Caterpillar lift trucks.

CHEMICAL

Velsicol Chemical appoints Ragsdale

Silas Ragsdale has been appointed district sales manager of the northwest region of Velsicol Chemical Corp.'s Agricultural Business Sales Group. He will cover North Dakota, South Dakota and north Minnesota from his base in Fargo, ND.

A 1975 graduate of Baylor University, Ragsdale joined Velsicol four years ago as a field representative and then worked as an industrial vegetation management specialist before this promotion.

WE SAVE OUR DIESEL FROM DROWNING.

WITH A BUILT-IN LIFE PRESERVER.

Toro stops at nothing to give you the kind of riding rotary mower you want most.

A mower that keeps you cutting. Gets the job done.

The latest example: our new Diesel powered Groundsmaster 72®. It offers you maximum productivity and reduced operating costs as well as remarkably low levels of noise and vibration.

But we didn't stop there.

We knew that water in fuel can literally drown a Diesel. Destroy its injectors and injection pump. And soak you with costly repairs and downtime.

So we built in a Roosa-Master water separator that removes more than 95% of the water. You simply unscrew a plug and drain it out.

And we didn't stop there.

We added other features that keep you cutting. Like a fuel primer pump, start assist glow plugs and a maintenance free battery.

Plus, other advantages you get with every Groundsmaster 72®, gas or Diesel. Such as hydrostatic drive and a Donaldson air cleaner.

Call your Toro distributor. He'll tell you all about Toro riding rotary mowers. Including the newest: our Groundsmaster 72® with Diesel engine.

THE NEW TORO DIESEL
It's our Groundsmaster 72®
now available with Diesel engine.

TORO®

THE PROFESSIONALS THAT KEEP YOU CUTTING.

"Toro" is an exclusive trademark of The Toro Company.
8111 Lyndale Ave. So., Minneapolis, Minnesota 55420.

Circle No. 140 on Reader Inquiry Card

CANDLESTICK PARK, A COMMUNICATION DILEMMA

By KENT W. KURTZ

***Candlestick Park's** natural field in 1980. Kezar Stadium (inset), the predecessor to Candlestick.*

During the National Football League playoff games in January, the media cursed and praised the natural grass playing surface in San Francisco's Candlestick Park. Controversy is not new to Bay Area playing surfaces for back in the days when the San Francisco Forty Niners played their home games in old Kezar Stadium, the turf or absence thereof, was cussed and discussed. Kezar Stadium, a city owned facility, has traditionally been plagued with over-use problems since it is used by colleges and high schools for athletic events.

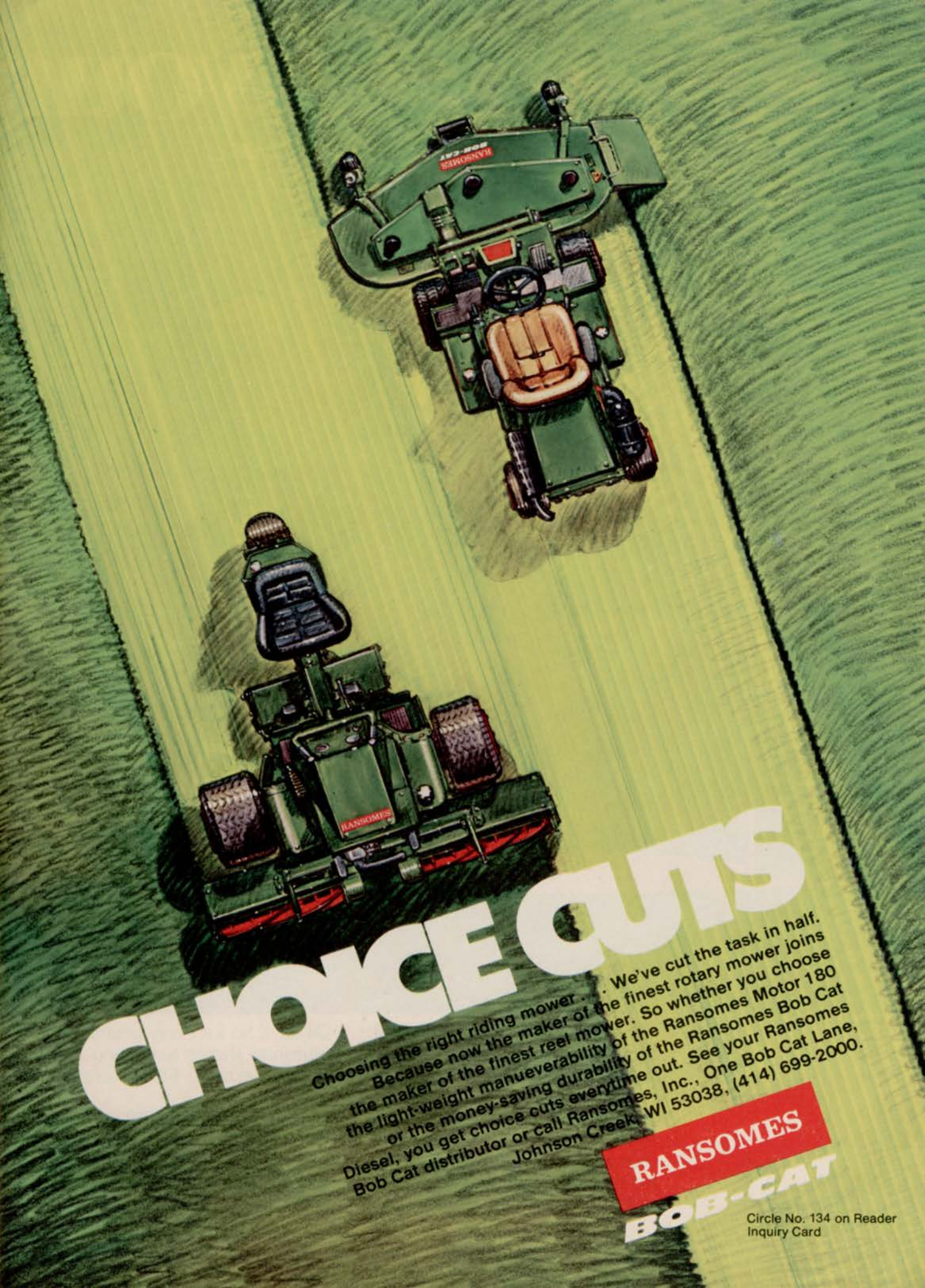
Kezar Stadium's doom was sealed back in the early 70's when complaints out-ran the offense. In most years the only turf surface consisted of overseeded annual rye-grass and during damp weather or following rain, the glossy, slippery surface attributed to poor footing.

When Roman Gabriel played for the Los Angeles Rams in a game at Kezar Stadium, he was heard to complain profusely because running backs, wide receivers, and quarterbacks slipped, slid and spent much of the game on the stadium floor. Other players such as Merlin Olsen and Deacon Jones were also vocal on the subject of playing conditions in Kezar Stadium. They actually urged the Los Angeles Rams' management to protest the condition of Kezar Stadium.

Said Olsen, "This is the last year that NFL Football should be per-

Continues on page 24

Dr. Kent Kurtz is professor, turfgrass management, for California Polytechnic State Institute, Pomona, California. He specializes in the care of playing fields and has observed the problems with natural and synthetic fields.


CHOICE CUTS
Choosing the right riding mower . . . We've cut the task in half. Because now the maker of the finest rotary mower joins the maker of the finest reel mower. So whether you choose the light-weight manueverability of the Ransomes Motor 180 or the money-saving durability of the Ransomes Bob Cat Diesel, you get choice cuts everytime out. See your Ransomes Bob Cat distributor or call Ransomes, Inc., One Bob Cat Lane, Johnson Creek, WI 53038, (414) 699-2000.
RANSOMES
BOB-CAT

Circle No. 134 on Reader Inquiry Card

How to cut your

Long-lasting Chipco® 26019 fungicide is as good for your budget as it is for your turf.

Because it gives you the longest residual activity, you'll need fewer treatments on greens and tees with Chipco 26019. And fewer treatments on fairways, where it controls diseases longer...from 21 to 28 days. So for every treatment you eliminate thanks to Chipco 26019, you'll save up to $10 an acre in fuel and labor!

And Chipco 26019 is strong medicine. No other fungicide gives better control of the major turf diseases. Chipco 26019 is effective on Helminthosporium

operating costs.

Please read label carefully, and use only as directed

Leaf Spot and Melting Out, Dollar Spot (including benomyl-resistant), Brown Patch, Fusarium Blight, Fusarium Patch (Pink Snow Mold), and Gray Snow Mold.

For healthier turf on greens, tees and fairways – plus a healthy cut in operating costs – control diseases with long-lasting Chipco 26019. It's just what the doctor ordered.

Rhône-Poulenc Chemical Company, Agrochemical Division, Rhône-Poulenc Inc., Monmouth Junction, NJ 08852. RHÔNE POULENC

CHIPCO 26019. It's strong medicine.

Circle No. 135 on Reader Inquiry Card

mitted in Kezar Stadium. Although they haven't had any rain here for 48 hours, the footing was as bad as if it had rained all morning. There's no turf here and no drainage. It's the league's worst field even when it's dry." And Deacon Jones said, "It's unfair to NFL teams to play in this joint. It is as bad for the 49ers as it is for the others. The field is pure dirt. You can't play football here, and I think it's up to the commissioner to legislate some minimum standards. If he did, he'd have to throw Kezar out."

The Move to Candlestick

Candlestick Park was built and opened in 1960 when the New York Giant baseball team moved from the east coast. Baseball players complained about the soil on the skinned infield which, due to unpredictable swirling winds, picked up soil particles and hurled them into the faces and eyes of the players.

In order to resolve the complaints an artificial turf surface was selected and replaced the natural grass playing field. Additional problems began when the San Francisco 49ers moved into Candlestick from Kezar Stadium and the seating capacity was expanded from 42,500 to 58,000 (61,000 for football) in 1972.

The artificial surface was praised as the "cure all" for all of the past mistakes and ills. This praise, however, was short-lived, and was summed up on November 14, 1973 in a Los Angeles Times Sports Section lead article, "Ban artificial turf says Brodie before someone gets killed." John Brodie was the San Francisco Forty Niners' quarterback who played in Candlestick during the early 1970's.

The artificial turf surface at Candlestick Park was considered the hardest surface to play on in the NFL. Many reasons were given for the decision to replace the artificial surface at Candlestick Park and include the following:

1 - The under-padding deteriorated to the extent that resiliency was nonexistent and the playing surface became "rock-hard."
2 - The surface became matted when the plastic grass-like blades broke down in the presence of sunlight.
3 - The seams split apart causing a safety hazard to players.
4 - Wet, damp weather caused poor traction, slippage increased and players experienced conditions comparable to those on the ryegrass at old Kezar Stadium.

Finally in 1979, Candlestick's 130,000 square feet of deteriorated synthetic turf was ripped up. Paramount in the decision was the cost of replacing the wornout artificial turf surface along with its pad for over $6.50 per square foot. The economics of staying with the artificial field was weighed against the cost of returning to a less expensive but improved natural grass playing surface.

Advancements in Natural Sportsturf

Over a decade ago, everyone was caught up in the fervor to eliminate natural grass playing surfaces in favor of the "trouble-free" and "lower maintenance" synthetics. However, the science and technology necessary to construct a good natural grass playing surface was neither available nor perfected at this point. In those days most sportsfields were seeded to on-site native soils with few modifications for drainage or the like. Soils used were often clay or silt which became heavily compacted, waterlogged or extremely hard. The result was a shallow root system, poor soil aeration, sparse grass and wet, soggy terrain. Worn-out turf and bare spots prevailed everywhere.

With the introduction of synthetic turf, shock waves were felt throughout the turfgrass industry giving impetus and stimulation to new ideas and concepts. Many hours were spent by some of the best minds and most progressive plant scientists and soils specialists to consider alternatives to artificial turf. These alternatives were found, refined and perfected.

Today, the new natural grass sportsfields are functional and highly sophisticated. They are engineered, well-planned, and constructed to meet the needs and demands of both the grass plant and the competitor.

New Breed of Manager

The new natural grass playing surfaces require a new breed of sophisticated turf manager, not just an out-door janitor. He must know what to do, how to do it, and when to perform any number of particular functions. Today's turf manager must care and be concerned about the field he maintains and whether or not he receives the credit due, he feels the satisfaction and inner pride of accomplishment.

Although many concepts and innovations in the design and construction of natural grass sportsfields are available today, the one principle each has in common is a good soil mixture. The soil is the base or foundation on which the field is constructed; therefore, the basic component of each of these surfaces is sand. Sand affords good drainage, excellent root development and a consistent texture. Since sand can be managed in most any weather and is uniform, it provides good footing and is predictable because it will not seal up under heavy use.

Recently the NFL players voted. The playing surface which ranked highest was one with a sand rootzone; synthetic surfaces finished a distant last.

The Allweather Field

An example of a sand rootzone system is the Sportsturf "TD" Field (TD = total drainage). This system was installed in Candlestick Park and developed by a man who has wide experience with sand fields and their construction, Melvin Robey.

Like other multi-use stadiums, Candlestick Park must endure full season play of both the San Francisco Giants and the 49ers. Stadiums which receive a lot of play need special attention.

The Sportsturf Field consists of the following seven specific points:

1. PURE SAND ROOTZONE

The uniqueness of a Sportsturf "TD" Field design is the all sand rootzone which provides a superior

Continues on page 26

"Mitsubishi tractors-the tough team that's never sidelined."

Bum Phillips, Head Coach, New Orleans Saints

In my business, I demand pro performance, the first time and everytime. That's why I want to tell you about the Mitsubishi line of two and four-wheel, mid-size tractors. Tractors built tough, to tackle all your landscaping and turf maintenance jobs, reliably and economically year after year.

Whether it's the compact Beaver, the economical Bison Diesel or the 38 hp, rugged Stallion, all Mitsubishi tractors can handle the implements you need for mowing, loading, grading, snow removal and lots more. And Mitsubishi's multi-cylinder, water-cooled, diesel engines keep fuel consumption low and performance consistently high.

Designed with you, the grounds maintenance professional in mind, Mitsubishi tractors have tough-job features like a differential lock for greater traction, live hydraulics for really accurate implement control and multi-speed PTO for equipment flexibility.

Bison Diesel
30 hp

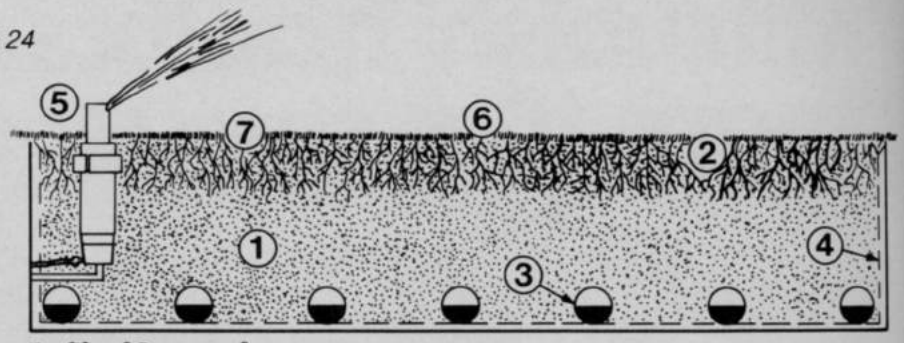
So, as one pro to another, if quality performance is the name of your game, check out the winning team of mid-size tractors built by the pros—Mitsubishi.

MITSUBISHI

Built by the PROS

For more information, see the yellow pages for your local dealer or write to Sumitomo Corp., Mitsubishi Tractor Division, 345 Park Ave., New York, NY 10154, (212) 935-8826.

Circle No. 123 on Reader Inquiry Card



Profile of Sportsturf rootzone.

natural grass playing surface, regardless of the weather at game time. Special characteristics of the sand allow the excess water to drain away, while maintaining the proper balance of air and water in the rootzone so a tough, deep rooted turf is developed. Careful selection of the sand also eliminates the hard, compacted fields that are such a hazard to the players. The depth of the sand is 18 inches throughout the stadium.

2. SPECIAL SURFACE MIX

The zone immediately beneath the grass receives special attention because of the importance of this area to the establishment of a tough root system. Small amounts of carefully selected organic amendments - peat, bark, hulls, bagasse - are incorporated into the sand. The addition of this material allows for the rapid development of the grass by helping to produce an environment favorable for root growth. The organic material adds to the overall resiliency of the turf, while helping to hold nutrients and store moisture in the sand rootzone.

3. FIELD MOISTURE CONTROL SYSTEM

The network of four inch drainage pipes (spaced at eight foot intervals) beneath the field play a key role in the control of the moisture in the sand. It is this piping system, with a unique modification contained within the pipe, that forms the nucleus of the Sportsturf "TD" Field.

4. PLASTIC BARRIER BENEATH SAND

To allow for total control of the water within the sand matrix, a plastic liner is frequently incorporated into the design. This lines aids in conservation of water and plant nutrients, reducing the overall expenses of supplying these essential elements to the grass. Another important function of the plastic barrier is to prevent external water from the surrounding subsoil from contaminating the sand.

5. SURFACE IRRIGATION

Supplemental surface watering is an important feature in the design of a natural grass field. The duplication of Nature's rainfall plays a significant role in the normal growth and development of a good athletic field grass. Where it is required, special techniques for burying the sprinkler heads beneath the surface of the grass have been developed.

6. FLAT PLAYING SURFACE

A new dimension is available in athletic field design. The excellent internal drainage characteristics of the all-sand rootzone permits the playing surface to be nearly level. Gone is the need for the traditional 18 to 24 inch crown that is necessary on all other types of athletic fields. Now everyone—coaches, players, spectators—will have an unobstructed view of the game.

7. NATURAL GRASS PLAYING SURFACE

According to a survey among athletes, a majority preferred to play on a natural grass field. The natural playing surfaces offer several advantages. On a hot day the grass acts as an air conditioning unit, easily reducing the surface temperature by 30 degrees, when compared to an artificial turf field. This is an important factor in insuring the safety of the players, whether it is just a practice session or an important league game. Another feature of real grass is its natural resiliency—the ability to absorb tremendous impact helps to protect the players from many serious injuries.

The Current Dilemma

During the recent NFL playoff games involving the San Francisco 49ers and New York Giants and later the Dallas Cowboys, newspaper headlines, player interviews and the broadcasting media discussed the condition of Candlestick's playing surface.

Newspaper headlines read, "Groundskeeper Tackling 49er's Tacky Turf", "Sod Squad Prepares Candlestick for Game", "Candlestick Park has Started to Show its Age", "Giants may Sue S.F. on Candlestick, Club losing patience over bad Conditions".

The players and coaches seemed to have mixed reviews. New York Giants coach, Ray Perkinds said, "it's still a horsebleep field." Linebacker Jack Reynolds of the 49er's, "it's like playing in a swampland," but running back Tony Dorsett (Dallas) said he was not concerned about the field; he gained 91 yards in the game.

Announcers for CBS said, "too much attention is being given to the playing surface." CBS announcer Irv Cross said, "everyone made a big deal about the field before the game, but it is holding up well, in fact it's in great shape, and it will be okay in the second half." Further, announcer and former Oakland Raider's coach, John Madden, said, "I've never known any field that caused any team to win or lose a game," and O.J. Simpson commented, "the players much prefer natural grass, none of the players really want to play on Astroturf."

So What's the Problem?

In January an article in a Phoenix newspaper (Republic Sports Wires) alluded to the fact that amateur groundskeepers all over the Bay area offered their theories as to why the field is cursed. Some of these amateurs theorized it was due to the location of Candlestick—excess moisture since it is adjacent to San Francisco Bay. Others said it was due to the poor soil content. One rumor, unsubstantiated of course, that the drainage system under the field was put in upside down so the water actually drains up. Let's look at some of the facts to see what the situation really looks like.

Originally the San Francisco Giants baseball team did not want natural grass but opted for a new artificial turf carpet to be in-

Continues on page 28

THESE INSECTS HAVE ONE THING IN COMMON

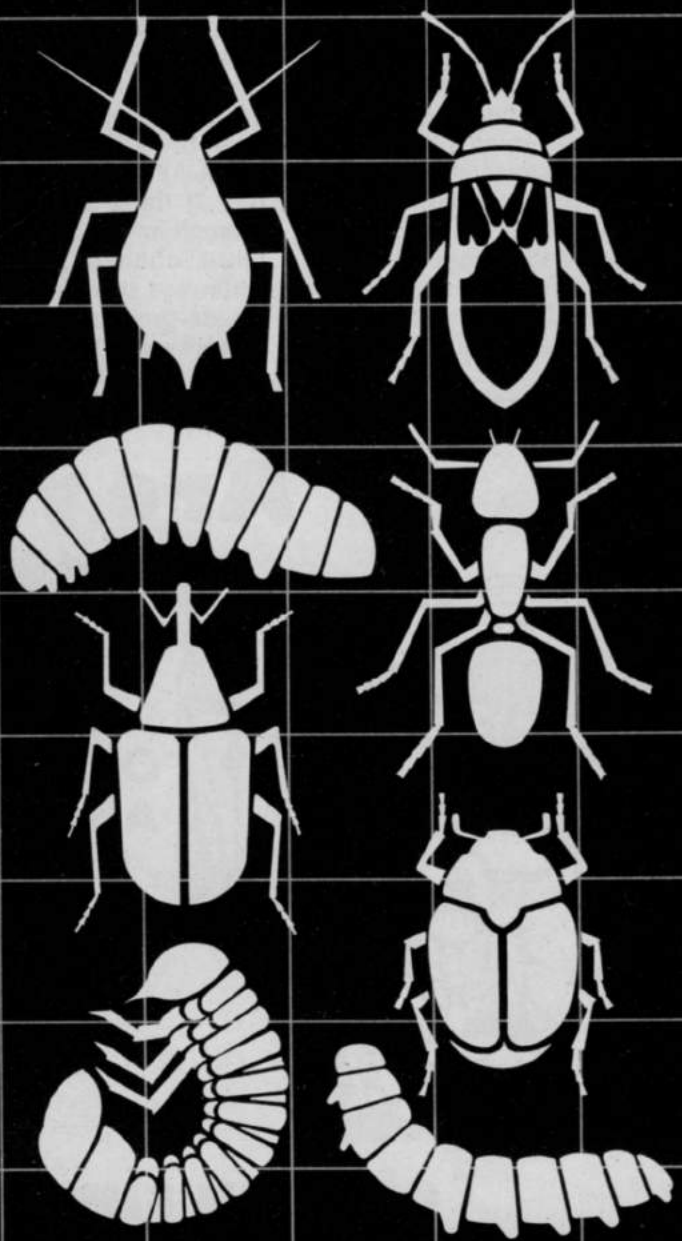
They now can be controlled by a NEW effective carbamate insecticide *TURCAM*®

TURCAM Insecticide offers the professional turf and ornamental care specialists a new effective broad spectrum insecticide for the control of a wide range of ornamental and turf pests including gypsy moth, Eastern tent caterpillar, certain scale insects and weevils, Japanese beetles, sod webworms, chinch bugs, mole crickets, white grubs and various nuisance pests such as fleas, wasps and fireants.

In addition to controlling these and many other pests, TURCAM

- Will not damage your ornamentals
- Will not get tied up in your turf thatch
- Is odorless
- Is suitable for use in Liquid Systems.

For further information on TURCAM including full labeling and recommendations for use please contact your local distributor or write to the address below.



TURCAM®

Broad Spectrum Insecticide

TM

BFC Chemicals, Inc.
4311 Lancaster Pike
Wilmington, DE 19805

Circle No. 105 on Reader Inquiry Card

stalled. The San Francisco 49ers wanted the natural grass field.

The field is maintained by the Giants' grounds crew during the baseball season and through the first four football games. It is then turned back to the City of San Francisco Park and Recreation Department to care for the field the remainder of the football season. Baseball only mows the grass field; they do not aerify, topdress, or fertilize. The football grounds crew is not sure what has been done, if anything, so they do enough to merely get by. In other words, the right hand doesn't know what the left hand is doing.

In October, Mick Jagger and the Rolling Stones performed at Candlestick Park. The fans watched and did whatever, on a field where no protective cover was used and the results were devastating.

Since July 1, 1981, the Bay area has received 13 inches of rain, 5 inches more than normal, and 10 inches more than last year during the same period of time.

Probably the biggest problem is due to city politics and a lack of follow-through to see that problems are resolved. Ironically (according to John Hillyer, San Francisco Examiner Staff Writer) it has taken a super season by the 49ers to stimulate popular awareness of the problem at Candlestick.

Hillyer further states that "years of indifference and neglect on the part of the city have left Candlestick Park in such a shabby condition that the patience of the Giants' organization finally is wearing thin." The Giants continue to be dissatisfied with park maintenance. However, to deal with the poor playing field would be merely to check off one item on the Giants' list of complaints about the City—owned facility. Complaints include, 1) the sound system is terrible, 2) there is concrete damage throughout the park (seats coming loose, chunks of stairs missing, walkways cracking and grass and weeds growing through them, 3) rust is everywhere, 4) the restrooms are run down, dirty, and plumbing and fixtures broken, 4) parking lot needs releveling and repaving and is poorly drained, 5) and lastly, the turf maintenance has been substandard.

The blame for the neglect is really difficult to pin down. Generally speaking the stadium is run by the Park and Recreation Department. However, Park and Recreation customarily responds to the ballclubs' problems by blaming City budget-makers for insufficient funds.

Before an appropriation can be put to work, it must be cleared by the Controller's office, the mayor's office, the finance committee of the Board of Supervisors, and then the full board, an unwieldly procedure that might shed some light on why it's difficult to get things done at Candlestick.

Tom Mallory, General Manager of Park-Recreation, says that "San Francisco is great for something called 'deferred maintenance'."

Continues on page 73

Are you a Miser with Fertilizer?

If you're cutting down on your fertilizer and water bill,

OREGON GROWN CHEWINGS AND CREEPING RED FESCUE

is the grass you need. It's fine bladed and blends very well with other turf grasses. The fine fescues are noted for being real misers when it comes to low maintenance turf areas.

Use Oregon grown fine fescues for overseeding any turf area. It's the Miser grass!

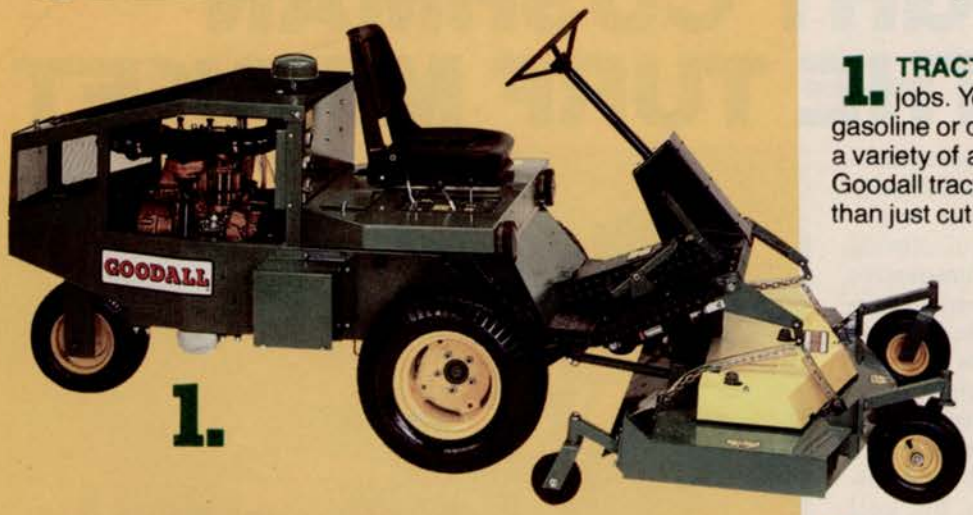
OREGON FINE FESCUE COMMISSION

1349 Capital NE • Salem, Oregon 97303 • 503/363•1022

Circle No. 131 on Reader Inquiry Card

BIG JOB OR SMALL...

Bunton Company builds 76 different Goodall mowers to meet your specific needs. Call or write today for our new full line catalog.



1.

1. TRACTORS: For the big jobs. Your choice of gasoline or diesel engines and a variety of attachments let Goodall tractors do much more than just cut grass.

2. PUSH MOWERS: For the small jobs. All Goodall push mowers are equipped with the best engines that the manufacturer builds. Even then, they have the reputation for outlasting several engines.

GOODALL CUTS IT ALL.

2.

3. EDGE-TRIMMER: Versatile, describes Goodall edger-trimmers. The adjustable 10-inch model edges curbs as easily as walk-ways. An athletic field line cutter attachment is available.

3.

4. SELF-PROPELLED: Real workhorses! Many options allow Goodall self-propelled mowers to be practically custom-built to meet specific mowing needs. Available in 24, 28, 32, 36 and 52 inch cuts.

4.

GOODALL

World's first direct drive rotary.

GOODALL

Division of Bunton Co.
P.O. Box 33247
Louisville, KY 40232 U.S.A.
Phone: 502/966-0550 Telex 204-340

Contract numbers:
G.S.A.: GS-07S-06286
H.U.D.: OPH(CO)m-3217

Circle No. 107 on Reader Inquiry Card

20th ANNIVERSARY

TIRE MODIFICATION BROUGHT CUSHMAN INTO THE TURF MARKET

It was an almost token modification of a Cushman industrial vehicle that led OMC Lincoln into a major nameplate in manufacturing what still ranks as an innovative line of turf-care equipment and related accessories. Back in 1963 an engineer substituted the original tires on an industrial Haulster vehicle with wider-tread components. The intent was to provide more traction for a superintendent wanting to use the unit on his golf course. Ever since, OMC Lincoln has been rolling ahead with the production of turf-care units, only today's are custom-engineered to take the toil and toll out of landscape management chores.

"Those first vehicles were by-products of our industrial units," reflects OMC Lincoln Marketing Director Frank McDonald. "What occurred, however, was a total facelift in our manufacturing and marketing strategy. We found ourselves moving into the turf-care industry with units that were totally dedicated in design to this marketplace."

That first vehicle was available with a 9- or 18-hp, air-cooled OMC engine and became popular with superintendents for hauling mowers, fertilizer, spreaders and sprinkler heads. They offered the advantage of reduced weight, preserving the turf so tediously manicured for golfers and park visitors. OMC Lincoln field salesmen said labor-conscious superintendents were even adding hitches for pulling a gang of mowers. That word got back to the engineering drawing boards in Lincoln indicating increased sophistication had to enter the product line.

"What developed was a corporate commitment to developing vehicles reflecting the demands of the marketplace," McDonald says. "We might have remained static and tried to condition the buyer to vehicles derived from our industrial line. Instead, OMC adopted the philosophy that it would react to the market instead of it conceding to us.

Today's Cushman Truckster, *adapted in 1963 from an industrial Haulster and redesigned in 1981.*

OMC Marketing Director Frank McDonald.

"This explains why our Cushman line evolved into a 'system' for turf care," he says. "We're constantly listening to what is needed around the world in turf-care equipment and reacting with units developed specifically for the tasks at hand."

For example, in 1965 Cushman manufactured a Haulster vehicle having an 800-lb. payload and the buyer could add several integrated accessories to the 3-wheeled units. A sprayer, cyclone seeder and fertilizer spreader were available. A fiberglass cab, snow plow, tool box, stake rack and passenger seat were other options. The players on the course may have related to Cushman golf cars, but the superintendent working alongside them was quite often using a Cushman vehicle with a directly related mission, McDonald observed.

In 1966 a Cushman model with a half-ton payload rolled out. It had a six-speed, dual-range transmission and variable-ground speed governor to lend operational discipline and flexibility to the chores served. A year later, this translated into an even more newsworthy thrust—a

Continues on page 34

WHY YOU SHOULD BUY A BACKPACK BLOWER, LAWN TRIMMER OR ALTERNATOR FROM A COMPANY THAT'S FAMOUS FOR SOMETHING ELSE.

It's only natural for people to think of John Deere as a tractor company. But if we can build tractors that run well and last a long time, there's no reason why our other products shouldn't do the same.

Take our two power blowers. The smaller one has a 21-cc engine whose 130-mile-per-hour windstream will blast leaves, twigs and snow out of your way in a mighty big hurry. It weighs less than nine pounds.

No. 4 Power Blower

The backpack model tips in at only 10 pounds more. With 40 cc, it does all its baby brother can do plus heavier duty tasks. And it has an optional spray attachment for even more versatility.

Need a lawn trimmer? John Deere offers five models. From a feather-light electric for lawn trimming to gasoline-powered models designed to handle everything from playgrounds to forest preserves.

90G Flexible Disk Trimmer

If you ever need auxiliary power, check our portable alternators. Five of them, from just over 2,000 watts to a powerful 6,500 watts. All have spark-arresting mufflers, on-board circuit breakers and low-vibration steel base frames.

John Deere also has five high-pressure washers. So there's a model for any job. From cleaning a golf cart to washing and waxing a school bus.

And that's only the beginning. John Deere has welders, space heaters, battery chargers, chain saws, air compressors, centrifugal pumps and a variety of power and hand tools.

Model 500 Portable Alternator

They're all built the same way. To last.

Just like the tractors we're famous for.

Nothing Runs Like a Deere®

For nearest dealer or free folder, write John Deere, Dept. 70, Moline, IL 61265. Or call 800-447-9126 (Illinois call, 800-322-6796).

Circle No. 112 on Reader Inquiry Card

CUSHMAN® FRONT

SIX GOOD REASONS TO MAKE IT YOUR FIRST CHOICE.

1 Plenty of power, plus economy.

Choose either the 18-hp OMC® air-cooled engine or the 4-cycle water-cooled diesel. Both deliver the power and performance you need. The Front Line mower is designed from the engine up, not from the tractor down, so every working component complements the power plant.

2 Fast, maneuverable, simple operation.

Hydrostatic drive and wheel-type steering make operation easy. Single rear turning wheel, and split front-wheel traction-assist pedals allow smooth, zero-turning radius; the driver's hands stay on the wheel. Mechanical clutch direct-drive PTO gives you a powerful tractor that's built to take it.

3 The cleanest of cuts.

The three heat-treated blades with air-lifts along with the Cushman deck and baffle design cut the grass cleanly. Clippings are lifted up and discharged out the chute evenly, eliminating the blade drag that eats up power. Choose a 60″ or 72″ deck; both offer top-mounted grease fittings and covers that remove with just two wing nuts. The 72″ deck also comes with wash-out holes so collected debris can be flushed out during normal maintenance.

4 No scalping.

Rear deck rollers work along with the front wheels to keep the deck and blades off the ground, even over rough terrain. Springs are also available to absorb deck weight and allow the deck to "float" with the contour of the ground. (These anti-scalp packages are optional, depending on the contours of your particular turf.)

5 Year-round versatility.

The Cushman Front Line doesn't go out of service when the mowing season is over. It can work for you all year 'round when you add accessories like the ROPS structure and weathertite cab, 60″ rotary broom (gas unit only) and the 48″ snow thrower.

6 Service when you need it.

Your Cushman Front Line dealer stocks parts for the engines, tractors and decks, and services the entire unit. He's an experienced, thoroughly trained professional, dedicated to keeping your Front Line mower in service.

For a free on-site demonstration of the Front Line quality, contact a Cushman Front Line dealer today. Or call us at 402-435-7208 for the location of your nearest dealer.

CUSHMAN® FRONT LINE.™

It stands to reason.

3109 Cushman, P.O. Box 82409
Lincoln, NE 68501

Circle No. 111 on Reader Inquiry Card

© Outboard Marine Corporation, 1981
All rights reserved.

CUT2-5780

ANNIVERSARY *from page 30*

SPRAYER WAS JOHN DEERE'S FIRST LANDSCAPE PRODUCT

Two generations *of John Deere lawn and garden tractors, the 1964 model of the 8-hp 110 Tractor (right) and the 1981 model of the 14-hp 214 Tractor.*

John Deere entered the landscape business in 1962, the same year that *Weeds, Trees & Turf* began publishing. The first John Deere landscape product was the No. 5 Lawn and Garden Sprayer. In 1963, John Deere built its first lawn and garden tractor, a 7 hp model 110 with such attachments as a center-mounted mower, snow thrower and front blade. The 110 provided a three speed trans-axle with a special feature: variable speed drive varied ratios on a belt and pulley system to allow the operator to slow down or speed up any gear without clutching and shifting. The tractor was available only through John Deere agricultural equipment dealers in the eastern part of the United States in 1963. An 8-hp 4-speed version of the tractor was sold through most John Deere agricultural dealers in the United States and Canada in 1964. The tractor was manufactured at the John Deere Horicon Works in Horicon, Wisconsin.

During the early 1960's, the Horicon Works became the world's largest producer of agricultural grain drills (mechanical seeders). But, because grain drill sales were subject to seasonal fluctuations, the John Deere organization sought a product line that would help the factory use its facilities more uniformly.

Gary Lindquist, division manager, grounds care at the Horicon works, explained why John Deere entered the outdoor power equipment business. "We had several research studies done for us on the lawn care business in the early 1960's. At that time, there appeared to be good potential for growth in this market. The research also determined that lawn care products would provide additional sales for John Deere agricultural equipment dealers. We found that the John Deere reputation for building high quality farm tractors and implements would help our CP (consumer products) business in rural areas, providing a strong springboard to sales in suburban areas. One of our early goals was to develop independent CP dealerships to help us penetrate the suburban, nonfarm market. It remains an important objective for our organization."

In 1966 John Deere added a 6-hp 60 Lawn Tractor and a 10-hp 112 Lawn and Garden Tractor. John Deere produced a 14-hp 140 Hydrostatic Tractor in 1967.

John Deere introduced a new utility tractor in 1968. The 820 Tractor was powered by a 3-cylinder diesel engine producing 31 hp at the PTO. It was manufactured at a John Deere factory in Mannheim, West Germany, and marketed in North America through the John Deere Tractor Works in Waterloo, IA.

During 1969, John Deere's Horicon Works experimented with custom colors, providing some lawn and garden tractors with seats and hoods of orange, red, yellow and blue—instead of the traditional green hood with yellow seat and wheels. It was soon found that customers preferred the green and yellow combination. "Once you establish a good reputation, your colors come to represent that reputation," said Lindquist.

Another significant event occurred in 1969. The Horicon lawn care equipment business had grown to such an extent that the production of grain drills was transferred to a John Deere factory in Iowa. The Horicon Works began devoting all its time and energy to the development of consumer products.

In 1970 John Deere replaced its 60 Lawn Tractor with a 7-hp 70 Lawn Tractor, and expanded the lawn care line to include six models of walk-behind rotary mowers, two riding mowers, lawn sweepers and a 12-hp 120 Hydrostatic Tractor. Walk-behind tillers and snow blowers joined the line in 1971. From 1972 to 1974, John Deere added an electric-powered riding mower, dumpcarts, and gasoline-powered edger-trimmers.

The 820 Utility Tractor was replaced in 1973 by a more powerful Mannheim-built tractor—the 830 developed 35 hp at the PTO. It was powered by a 3-cylinder diesel engine and featured an 8-speed transmission with 2-lever control and built-in shuttle shift.

1974 was a pivotal year for John Deere. The company introduced what it termed the "second generation" of lawn and garden tractors, lawn tractors and riding mowers for sale in 1975. "We put side panels on the tractors and enclosed the engines for quiet operation," according to Lindquist. "We styled the tractors so they would have a family resemblance to John Deere farm tractors, a feature that we thought would appeal to both rural and suburban customers. We were the first manufacturer to offer a complete line of quiet lawn and garden tractors and riding mowers."

On January 12, 1977, the Horicon Works celebrated a milestone by manufacturing its half-millionth tractor. The event pointed up the dramatic progress the factory had made in only 15 years. Factory plant area had increased by 81 percent, and average yearly employment had more than doubled.

John Deere added compact utility diesel tractors to its grounds care line in 1978. The 22-PTO-hp 850 and the 27-PTO-hp 950 are marketed through the John Deere Tractor Works in Waterloo. Both tractors are powered by 3-cylinder diesel engines. A 33-PTO-hp 1050 Tractor joined the line in 1979. The 1050 is powered by a turbocharged 3-cylinder diesel engine. An MFWD (mechanical front wheel drive) option gives the 1050 positive traction in mud, slush and snow. The MFWD option was extended to the 950 as well.

In 1981 John Deere added two more compact utility diesel tractors: the 14.5-PTO-hp 650 with a 2-cylinder diesel engine, and the 18-PTO-hp 750 with a 3-cylinder diesel engine. Johnny A. Dickinson, division manager, utility tractors at the Waterloo factory, said, "These new diesel tractors are designed to fill the gap between John Deere gasoline-powered lawn and garden tractors and our higher-horsepower diesel tractors. Our research shows that prospects require a greater range of forward speeds than is now available in many competitive tractors. They want ample ground clearance, a compact size for storage in a utility shed, a more convenient implement attaching system, and the availability of a full line of implements. Our compact utility diesel tractors meet these objectives."

The lawn tractor business has been a significant growth area for the John Deere consumer products organization. From 1977 to 1981, the annual production at the Horicon Works has increased by 1041 percent.

The most recent addition to the John Deere compact utility tractor line is the 1250—a 40-PTO-hp diesel tractor.

ANNIVERSARY *from page 30*

full model line.

The 1967 models were dedicated designs for turf care. There was an 18-hp Turf-Truckster vehicle having a pickup-style bed, an 8-hp unit with the same feature and one having a stripped chassis. A unit oddly enough named the Lobster had an 8-hp engine, along with a sister unit powered by a 5-hp engine to provide personnel transports.

Always sensitive to the user, OMC Lincoln entered the 1968 season with a 12-hp Turf-Truckster and beefed up the 5-hp Minute-Miser vehicle with a 6-hp engine. A new sprayer having rear boom delivery operated by the vehicle PTO emerged as another innovation.

The 1969 season evolved into Truckster vehicles powered by 18-hp, air-cooled engines equipped with pickup beds, wide-box dumpbeds and a 12-hp pickup and dumpbed were other options.

McDonald notes with pride the 18-hp OMC engine's legacy of durability and performance. While major automakers were constantly building bigger blocks, OMC Lincoln decided to make its engine simply better with ongoing refinements of the same standard design.

The '60s rolled out and the '70s in with the unveiling of a 4-wheeled truckster. The Lobster lost its niche in the product line, however, just as the Cushman Eagle motorscooter did in 1965. The demand simply wasn't there, so OMC Lincoln focused its product emphasis elsewhere.

The year 1973 reflects that fact. OMC Lincoln was heralded then for introducing its quick-change, pin-disconnect system on Turf-care units. The ability to promptly swap utility beds and accessories saved manhours and lended new flexibility in a vehicle having consolidated roles. That year the firm also introduced its Runabout vehicle which has become a mainstay in its turf industry marketing.

"That one feature placed us so far ahead of the competition that we didn't undertake another major refinement until 1978," McDonald notes. "That year, however, we introduced our radial frame on the Runabout and added a Greensaver aerator attachment to those accessories already established. The Turf Minute-Miser went the way of the Lobster. In 1979, we began marketing a 2-seat Runabout and the following year a power converter to accommodate the growing number of electric tools used out on the course."

The Turfcart model followed a year later, providing the industry with a low-cost transport for minor chores. Cushman begins 1982 with a totally redesigned model line.

"The industry is unique so we will continue listening to what it needs and reacting accordingly," McDonald predicts. "We intend to maintain our role as a bellwether."

STATUS REPORT:

HORTICULTURAL SPRAY OILS FOR TREE PEST CONTROL

By WARREN T. JOHNSON

Figure 1. *The dark spots on the undersides of Amur maple illustrate an injury symptom caused by a spray containing excessive oil.*

Figure 2. *The tiny purplish spots with yellow halos illustrate injury symptoms on Redbud from spray containing excessive amounts of oil.*

Dr. Warren T. Johnson is professor of entomology for Cornell University, Ithaca, NY. He is the national expert on oil sprays for tree and shrub pest control, doing most of the research on the subject.

Why should we expand the use of oil for pest control at a time in history when this would further deplete a non-renewable resource? If we reflect for a moment that the pesticide industry is mostly a petrochemical industry, the question becomes no more pertinent to horticultural spray oil than it is to synthetic pesticides.

Then why do we pick a 100-year old commercial product and reinstate it into a pest control program when the claim for modern chemicals is that they do a more efficient job? This is an appropriate question, but to respond requires an analysis of the situation and a bit of historical reminiscence. First, the history.

Oil is one of the oldest *natural* pesticides. In the first century A.D., the Roman scholar Pliny wrote that mineral oil would control certain plant pests. It was also known at that time that the oil was liable to injure plants. Jumping ahead several centuries and to the United States, oils were used to control insects before the Civil War, and by 1865, kerosene (then known as coal oil, because it was derived principally from oil-bearing bituminous shales) was recommended for the control of scale insects on Florida citrus. By World War I, U.S. Department of Agriculture entomologists were recommending an oil emulsion that was later dubbed "United States Government boiled emulsion" for the control of San Jose scale on apples.

Between 1942 and 1970, teams of petroleum chemists and entomologists made great strides in spray oil science and technology. Now, there is a good understanding about the components of oil that cause phytotoxicity and the oil fraction needed to kill insects and mites.

During the three decades prior to 1970, every major oil company had its favorite horticultural oils and much marketing competition. Most of these were sold for dormant use with a viscosity range from ca. 100 to 220. None were exactly alike in terms of physical properties (see Table 1). There were four state agri-

cultural experiment stations—Florida, Texas, California, and New York—that had scientists studying the various oil properties. These scientists established specifications for the oils to be used in the control of fruit insects and mites in their respective states, based upon the needs of their fruit growers.

Arborists and nurserymen benefited from the work on fruit trees because many of the pests controlled by oil were the same pests that injured shade trees and shrubs. Remembering that spray oils were developed for fruit trees, it is easier to understand why some of these oils when applied to certain shade trees and shrubs, not only killed arthropods, they occasionally injured the plants that the applicator was trying to protect. The development of so-called 60- and 70-second viscosity superior spray oils added to our confidence in the phytosafety considerations of ornamental plants because they evaporated more rapidly from treated plants.

Table I.
Specifications for Superior Spray Oil

Properties	Standard
Saybolt Universal Viscosity at 100° F, seconds maximum	*
Gravity, ° API (minimum)	30°
Unsulfonated residue (UR) (minimum) (%)	92%
Pour point, °F (maximum)	20°
Distillation at 10 mm Hg, °F	
50% point	420 ± 8°F
10-90% range (maximum)	80°F

*For technical reason, a specific viscosity standard has not been made a part of these specifications. Oils otherwise defined here may fall within the 68-74 second visocity range.

The 1982 Spray Oil

Today, superior horticultural oils are being produced by four oil companies. Chevron refines horticultural oil primarily for use in California. They have withdrawn their product, Ortho Volck spray oil, effective in 1982 because they can make a greater profit from other kinds of petroleum products. Exxon and Gulf have a 70 second viscosity superior oil in tank car and barge shipment quantities for use on citrus in Florida and the Rio Grande Valley. This oil is refined to meet the Florida-Texas citrus spray oil specifications. The Sun Refining and Marketing Company supplies spray oil to a wide range of markets throughout the United States with sales largely to agricultural chemical companies for repackaging and marketing. The Ag chemical companies prepare their own labels and sell in small quantities (1 pint to 55 gallons) to home gardeners, arborists and other spray contractors. The oil you use in 1982 will have the typical properties shown in Table I, some of which will be stated on the label.

Spray oil specifications are couched in the jargon of petroleum chemistry but this important information should not be difficult to understand. *Viscosity* is a measurement of oil heaviness; the time it takes for a given amount of oil to flow through a hole of precise size and measured in seconds. The *gravity* test is another technique to weigh oil. When related to viscosity and unsulfonated residue (UR) it provides an index to the oil paraffinicity; spray oils must be largely paraffinic to be safe for plants. The gravity specification is measured in terms of degrees; the higher the number, the more paraffinic the oil. Thirty (30°) degrees is the minimum standard. The *unsulfonated residue*, expressed in percent, is a measure of purity or degree of refinement. The process involves the chemical reaction of oil with concentrated sulfuric acid. That part of the oil that reacts with the acid (aromatic portions) can be separated, leaving the unsulfonated residue or paraffinic oil. White mineral oil is a paraffinic oil that goes through the sulfonization process several times and is used for pharmaceutical purposes, e.g. lotions, cosmetics and laxatives. It has a UR of about 99.5%. *Distillation* temperature range is a measure of the volatility of an oil and is the most valuable criterion for determining the pesticidal activity and paraffinicity of an oil. Volatility is monitored by controlling the 50% point of the distillation range to a narrow specified range and the 10%-90% range to a maximum of 80°F. The distillation profile and the unsulfonated residue are the two most important tests assuring an acceptable spray oil. Without the above specifications, there is no scientifically acceptable way to compare pest control or phytotoxicity results with other oils.

Mode of Insecticidal Action

Modern spray oil can kill arthropods in two ways: (1) by penetrating the egg and interfering with the vital metabolic processes or (2) by preventing respiration through egg shells or respiratory passages (tracheae) of both immature and mature insects. In the egg, a growing embryo must have a constant exchange of gases. Interrupting this gas exchange, even for a few hours, may bring about its death. A dormant egg in autumn or winter has a minimal need for gas exchange. An oil film around a dormant egg may evaporate before vital processes are seriously affected. If an oil-sprayed, dormant, overwintering immature or adult insect can "hold its breath" for a week or more, it may overcome the presence of oil. One may extend the oil residual period by increasing the dose. The key feature in oil efficacy is the arthropod's oxygen requirement. During the dormant season, the dosage may range from three to five percent. During the summer, or verdant season, most insects require an uninterrupted source of oxygen. If impeded for a few hours in the case of eggs, the arthropod will not be able to survive. Normal dose for summer treatment varies from 1 to 3%.

Oil Phytotoxicity - Its Mode of Action

"Do not spray on oil sensitive plants!" This admonition is often found on old superior oil labels, but who knows what it means? Some very delicate annual flowering plants such as Impatiens will show

TABLE 2

An abbreviated sample of a proposed label as submitted to the Environmental Protection Agency.

SUNSPRAY 6E

A SUPERIOR HORTICULTURAL SPRAY OIL

CAUTION: KEEP OUT OF REACH OF CHILDREN
HARMFUL IF SWALLOWED. IF SWALLOWED, DO NOT INDUCE VOMITING.
AVOID BREATHING OF VAPORS AND SPRAY MISTS. DO NOT POLLUTE FISH AND WILDLIFE WATERS BY RINSING OR DRAINING OF EQUIPMENT. SEE OTHER CAUTIONS

55 GALLONS NET • U.S. STANDARD

EPA REG. 862-11

ACTIVE INGREDIENT:	BY WEIGHT
PARAFFINIC OIL*	98.8%
INERT INGREDIENTS	1.2%
	100%

Sun Oil Company, 1608 Walnut St., Philadelphia, Pa. 19103

*Unsulfonated Residue ..... 92% min.
Grade of Oil Superior/FC-412-66/Unclassified
Weight per Gallon ..... 7.1 lbs.

CAUTION

General—All horticultural oils interfere with or slow plant transpiration and respiration during the period of evaporation. **Do not apply during periods of drought or when plants exhibit moisture stress.** Never apply concentrated spray oil to any part of a plant. Do not use 6E in combination with or immediately preceding or following applications of dinitro compounds, sulfurs, captan, folpet, Dyrene, Karathane, Morestan, or Sevin. Check tank mixtures for chemical and physical compatability.

Ornamental Plants—Oil will remove the glaucus (blue) bloom from such evergreens as Colorado blue spruce and Koster spruce. Use with caution and reduce dosage for summer applications to Japanese red maple, Amur maple and black walnut.

Timing of Treatment—You must determine the precise timing to fit local growth and climatic conditions.

MIXING DIRECTIONS

1. Add sufficient water to the mixing tank to allow proper agitation by pump or paddles.
2. Add other desired pesticides as listed on left panel mixing thoroughly prior to the addition of oil.
3. Add oil under agitation when ¾ full topping off with water to form milky solution.
4. Maintain agitation until solution is used.
5. In small equipment lacking agitators—stir or shake diluted spray frequently during application.

DIRECTIONS FOR USE

CROP	INSECTS AND MITES	Application Rate 6E Gallons per 100 Gallons of Dilute Spray	Time of Application (Stage of Development)
APPLES	Apple Red Bug	2	Dormant
	European Fruit Lecanium Scale	2	Dormant
	Fruit Tree Leaf Roller	3	Dormant
	European Red Mite	2	Green Tip to Delayed Dormant ½" Green
	San Jose Scale	2	Delayed Dormant ½" Green
	Scurfy Scale	3	Delayed Dormant ½" Green
PEARS	Fruit Tree Leaf Roller	3	Dormant
	Pear Leaf Blister Mite	3	Dormant
	Pear Psylla	2	Late Dormant
PECANS	Obscure Scale	3	Dormant
PEACHES	Cottony Peach Scale	3	Dormant
PLUMS & PRUNES	Eurpean Red Mite European Fruit Lecanium Scale	2	Dormant to Delayed Dormant ½" Green
		2	
TREES & SHRUBS	Spider Mites	3-4	Dormant
		2-3	Verdant
	Eriophyid Mites	3-4	Dormant
		1-3	Verdant
	Scales & Mealybugs	3-4	Dormant
		2-3	Verdant
	Psyllids & Whiteflies	2-3	Verdant
	Aphids & Adelgids	3-4	Dormant
		2-3	Verdant
	Plant Bugs, Treehoppers	3-4	Dormant
	Leafhoppers	2-3	Verdant
	Leafrollers, Leaf Tyers Webworms	3-4	Dormant
	Cankerworms	2-3	Verdant

SEE MIXING DIRECTIONS ON OPPOSITE PANEL

no adverse reaction to oil used at summer dosage. What, then, are the oil sensitive plants? First, lets deal with some basics. Concentrated oil is a herbicide. As a concentrate it penetrates both bark and leaf tissues wreaking havoc with living cells. Oil painted in narrow bands on the bark of certain young trees such as red maple or sumac will kill them.

When diluted oil is sprayed on foliage, twigs, and small branches, the stomates of the leaves and the lenticles of the bark get covered with a thin deposit of oil that interferes with the exchange of gases. This becomes the basis for phytotoxicity. There are other factors too, that may cause plants to react adversely. Usually, it's the state of growth that makes the difference. A dormant plant can tolerate a heavier deposit of oil than a plant growing actively. Some of the hundreds of leaf stomates may be closed by a film of oil but whether symptoms of injury will appear depends upon the number of stomates that are closed, the amount of oil that is deposited, how fast the oil is evaporating and the clearing capacity of the stoma guard cells. Some plants, such as Scots pine, can tolerate a tremendous dose of oil on new and old needles (33% oil) even in early July with the temperature exceeding 90° F. Other plants, such as the Japanese maple, can tolerate no more than 3% oil under the best of growing conditions. Other trees and shrubs sensitive to oil are Amur maple, black walnut and Aucuba. This is not to say that oil should never be used on them for insecticidal purposes, but other factors need to be considered.

Environmental conditions such as soil moisture, relative humidity and wind speed are of major importance. Any plant suffering from moisture stress is a candidate for severe foliage injury if it is sprayed with oil. I am of the opinion that any common woody ornamental plant can tolerate 2% of oil in the verdant condition if it is healthy, the soil moisture is adequate, and

the relative humidity creates conditions for fairly rapid evaporation of the oil. Under normal application temperatures, (35° - 100°F), it appears that temperature alone is not a factor.

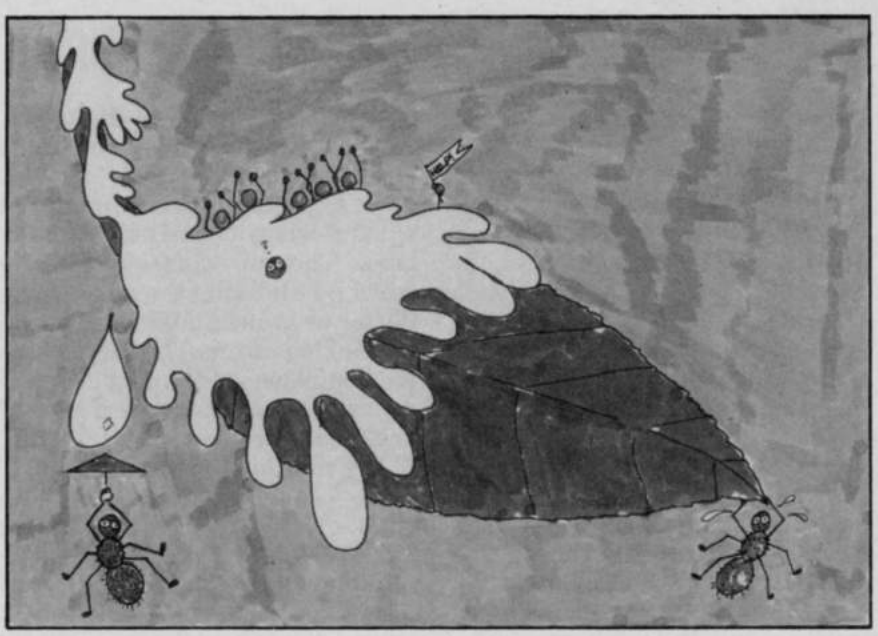
Oil Persistence on Foliage

Immediately following a spray treatment, the foliage will have a pleasing, shiny luster, the result of a thin film of glistening oil. The actual amount of oil that will remain on a leaf will depend largely upon the pubescence and other physical characteristics of the leaf. Honeylocust leaves, for example, sprayed with 4% oil will have a shiny appearance, particularly on the upper surface, for more than eight days. Plants with abundant leaf hairs (trichomes) on the undersurface will have an altogether different appearance when oil is on them. They will feel oily but will not glisten. Some leaves with large numbers of leaf hairs will appear to be soaked with oil.

Plant leaves with a vast number of trichomes hold a larger volume of the spray solution and thus receive a higher concentration of oil after the water evaporates. Because the concentration of oil is higher, the oil remains on the plant longer and takes longer to evaporate. Leaf hairs may be both beneficial and deleterious. On the one hand, they retain the oil on the insect for a longer period, but on the other, they block the stomates for a longer period, also. In general, leaves with dense pubescence should be considered oil-sensitive and should receive a lower rate of oil.

Symptoms of Phytoxicity

When leaves are deprived of stomatal functions for any reason, the foliage becomes slightly yellow. This symptom occurs when an excessive amount of oil is uniformly distributed over the leaves. More often than not, there will be a larger deposit of oil at the leaf tip or margins. If the oil on the margins remain too long, the margins become yellow; later they darken appearing water soaked, not unlike some stages of edema, and later they become dark purple. The ultimate symptom is brown, necrotic tissue. The injury is not always



marginal but may occur as small spots following the same symptom sequence (Figure 2). If the symptoms do not progress beyond the water soaked stage (Figure 1) the leaf recovers or at least can function with a fair degree of efficiency.

Efficacy

Since much of the oil used ten or even five years ago was not the same as that used today, efficacy comparisons may seem inappropriate. Fortunately, data taken from plants treated with 60 and 70 second oils compare favorably with the oil that is currently available. With the distillation, UR, and gravity properties of older oils for comparison, one can interpolate the probable efficacy of the new oil. From interpolated data we can assume that the currently refined spray oil (Table 1) will kill the eggs of any of the following arthropod groups: spider and eriophyid mites, armored and soft scales, mealybugs, psyllids, asphids, adelgids, whiteflies, plant bugs, leafhoppers, treehoppers, leafrollers, leaftyers, webworms and cankerworms. We can also assume that the new oil will control a wide range of arthropods in stages other than the egg. Some of the recommendations found on the new label is based on such interpolated data.

A film of oil interferes with the feeding capabilities of viruliferous sucking insects, but except for this spray oil (Stylet Oil*) seems to have little if any tactile effect on crawling insects, or flying insects migrating to oil treated surfaces.

*trade name registered in Florida

Labels and Brand Names

Because of the inherent safety to humans and mammals of purified paraffinic oils, the Environmental Protection Agency has exempted these products from many of the regulations imposed upon the promoter's of synthetic organic pesticides, namely residue requirements. There has also been a relaxed attitude regarding the way oils are described on their labels. Some labels' ingredient statements were so vague (before EPA) that the product described would have also been a good description for a machinery-lubricating oil.

Since superior horticultural spray oil has no precise formula, it is impossible to provide a precise ingredient statement. The source of the crude oil makes a major difference in the product that comes from the distillary's pipes. Likewise, a few degrees of difference in the distillation temperature can make a difference in the potential for phytotoxicity and pesticidal activity. Nonetheless, today's product must have a better identity via the ingredient statement. Green Industry users of horticultural spray oils have been without a property description largely because it was not on the label and further, few knew that it existed. It was assumed, erroneously, that an oil label was as complete and as explicit as the label for a synthetic organic insecticide.

We are closer now to a standard

product than ever before, in part because there are fewer refineries in the business of making horticultural oil, and in part because only one oil refining company actively promotes its product beyond the citrus industry.

In March 1982 the Sun Refining and Marketing Company presented EPA officials with a change in their horticultural oil label which may prove to be the best thing that has happened to promote spray oil in the past thirty years. In terms of its physical properties, Sun's oil comes fairly close to the specifications developed by the several agricultural experiment stations, but it does represent a compromise. The abbreviated label (Table 2) shows some of the major changes and additions under consideration.

For the first time there is an attempt to provide an acceptable common name—*Superior Horticultural Spray Oil.* The use recommendations and directions are greatly expanded with some specific and some general directions. General directions allow the user a greater degree of freedom to use his own experience and judgment without being inconsistent with the label. This, of course, works two ways by allowing the spray contractor or grower a greater chance for making errors. The former distinction between dormant and verdant oils now becomes a matter of dosage; the product is the same.

The caution statement gives a short, condensed sentence about what oils do to plants; "(They) interfere with our slow plant transpiration and respiration while the oil remains on the plant." The most critical point about the potential for phytotoxicity is in the admonition "Do not apply during periods of drought or when plants exhibit moisture stress." Specific precautions are limited to conifers with a glaucus bloom; reduced dosage is suggested when oil is used on Japanese red maple, Amur maple and black walnut.

There will continue to be brand names, but if a standard label is developed the only difference will be in the art work and the visual appeal of the label.

Summary

With one major producer of superior horticultural oil and one basic label there should be one set of recommendations. The user can expect control over a wide range of species and if the applicator maintains proper "quality control" over mixing and spraying there should be no problem with phytotoxicity. With phytotoxicity based upon excessive dose, and tree and shrub turgor, oil will take its rightful place in the arsenal of weapons for use in integrated pest management. If the new proposed label is approved, the arborist and spray contractor will legally be able to use oil on hundreds of woody ornamental plants, and, if his judgments are just and reasonable, he will be able to do a better job at less cost to the consumer while properly using one of our safest insecticides. **WTT**

"CLICK."

America's becoming attached to multimot.

SOLO introduces an impressive array of outdoor equipment powered by a tough, compact 1½ hp SOLO-BUILT two cycle engine. It quickly attaches to a **lawnmower, grass trimmer, brush cutter** or **chain saw.** Also a **hedge trimmer, tiller/cultivator, hand held air blower, centrifugal** or **high pressure liquid pumps** and **sprayers.** And more to come — all SOLO engineered to attach in seconds without tools.

SOLO ensures return visits from your customers now and in the future as our line grows.

Start selling multimot from SOLO and develop some lasting attachments with your customers.

solo multimot

SOLO Inc., 5100 Chestnut Ave., P.O. Box 5030, Newport News, Va. 23605-0030
(804) 245-4228 Telex 823-664
Circle No. 137 on Reader Inquiry Card

ORTHENE–INSECT PROTECTION AT ITS BEST.

ORTHENE® Tree & Ornamental Spray is a giant step forward in protection. It kills a wide range of insects, on contact and with a lasting residual action. In fact, it's probably the only insecticide you need.

Here are some of the insects it kills; aphids, bagworms, birch leafminer, tent caterpillar, Douglas Fir tussock moth larvae, gypsy moth larvae, webworms, scales, California oakworm, spring and fall cankerworms, Nantucket pine tip moth larvae, and adult root weevil.

AVOID ACCIDENTS: For safety, read the entire label including precautionary statements. Use all chemicals only as directed.

FOR PROFESSIONAL USE ORTHO PRO

Chevron ORTHO Chevron Chemical Company

TM's ORTHO, CHEVRON, CHEVRON DESIGN, ORTHENE – REG. U.S. PAT. & T.M. OFF.

Please send me more information on ORTHENE.

Name_____

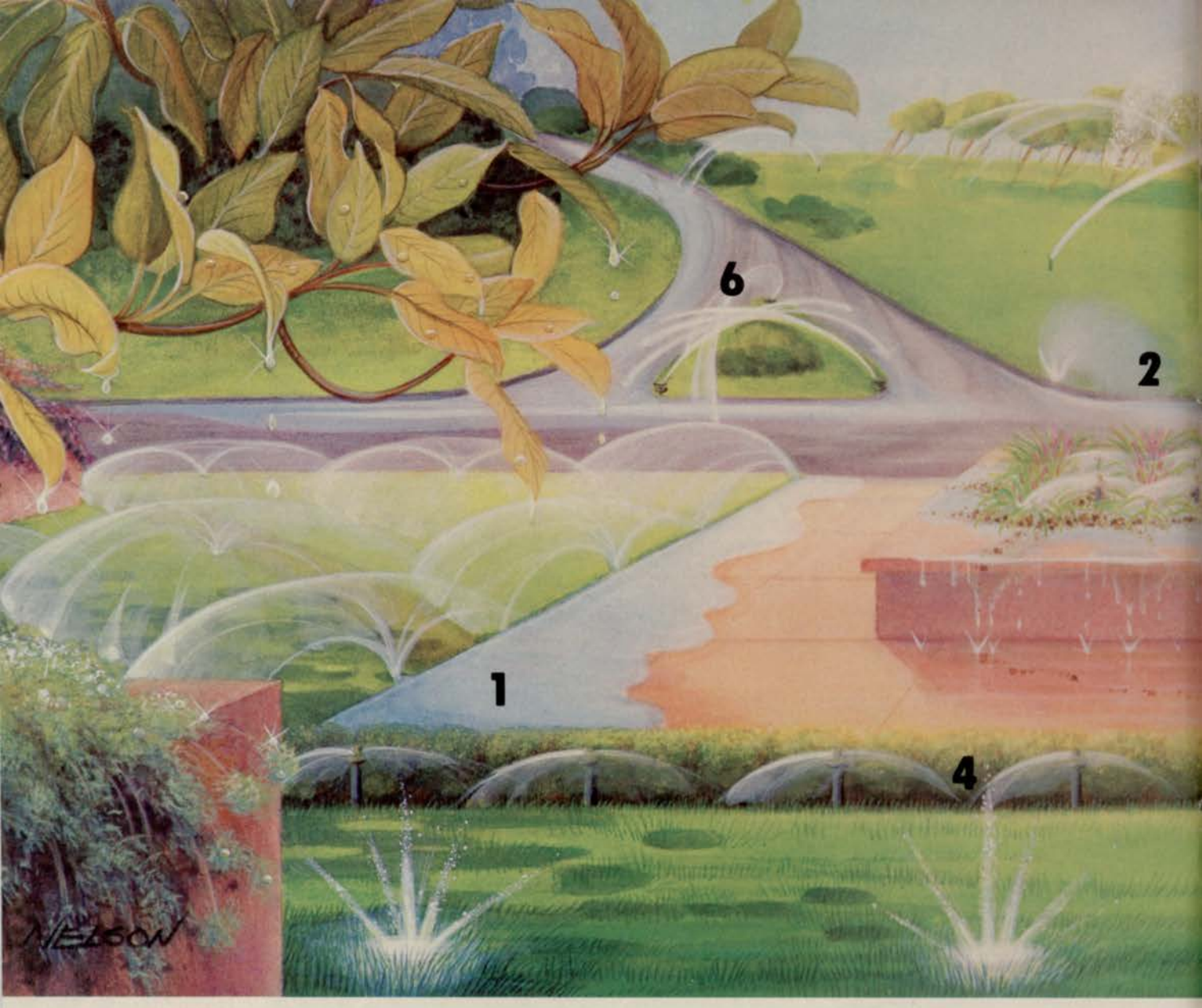
Company_____

Street Address_____

City_____ State_____ Zip_____

Mail to: R. G. Gras, Chevron Chemical Company, 575 Market Street, San Francisco, California 94105

Circle No. 109 on Reader Inquiry Card



10 WAYS YOUR SPRINKLER SYST AND 10 WAYS

Sprinkler systems that waste water don't do your business or the landscape any good. With the possibility of a water shortage looming on the horizon, forced restrictions may limit the amount of water for irrigation. To meet this challenge, Rain Bird is developing better ways to budget water wisely. Look above. There are ten ways your sprinkler system can go down the drain...and ten new water conserving products from Rain Bird that will help you avoid it!

1. Watering too fast, too often. Save water with the precision that comes from having a separate program for each station on the clock. The new ISC "Independent Station Controller" gives you independent control of each valve for exact programming to meet the watering needs of diverse plantings. Available in 16, 24 and 32 station models, the ISC features a unique water budgeting system for instant time adjustments.

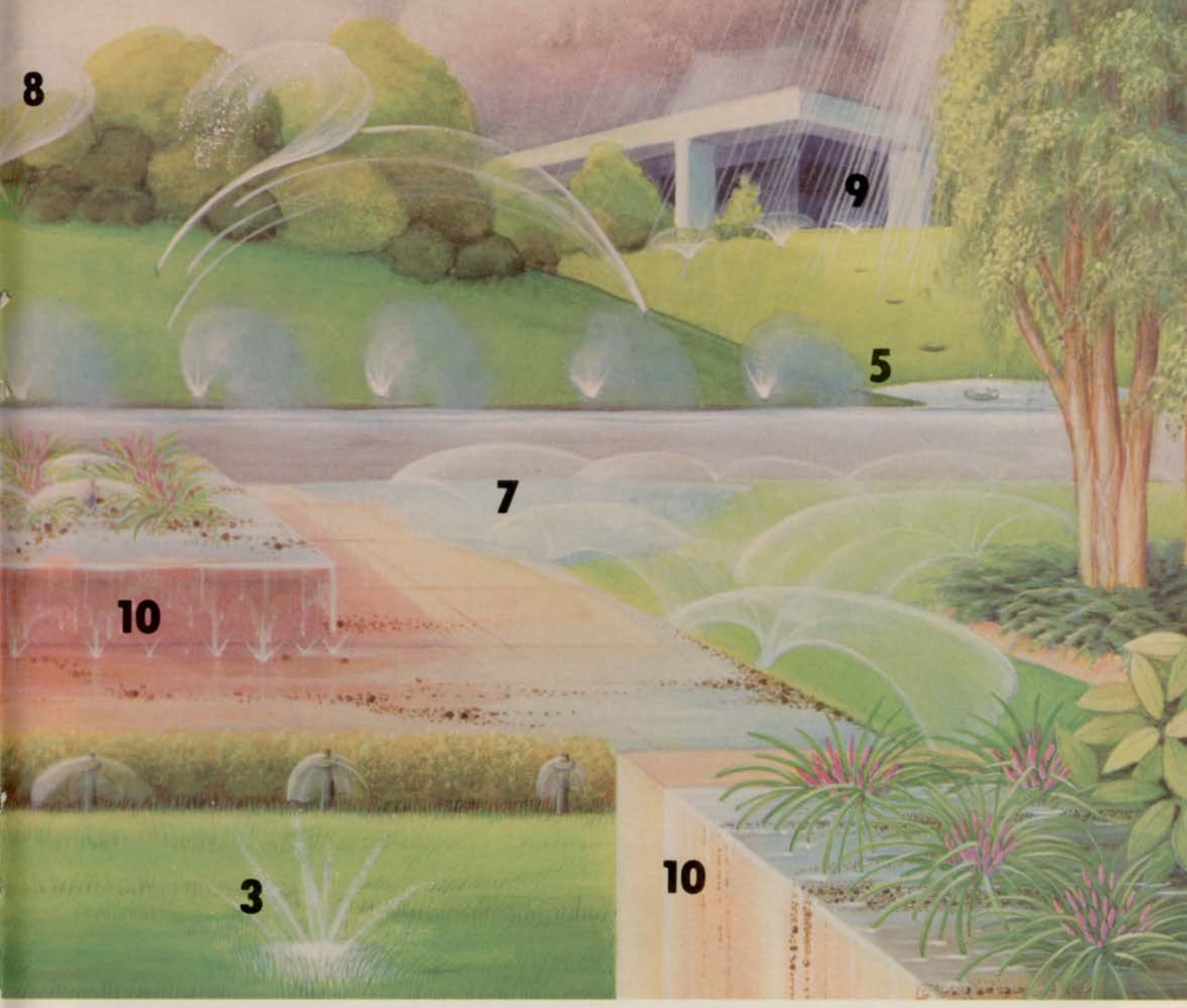
2. Misting sprinklers. Stop wasteful misting from over pressurized sprinklers with the new PRS Pressure Regulating modules with Schrader valves from Rain Bird. Taking pressures as high as 200 psi, the PRS modules effectively regulate from 100 psi down to 15 psi (±5 psi). And they are suitable for all Rain Bird EFA, EP, or PVE Series electric control valves.

3. Obstructed water distribution. Reach above taller drought-tolerant turf cuts and ground covers for uniform water distribution with the new Rain Bird 1800 Series high-pop spray heads. The new patented co-molded wiper seal assures positive pop-up and pop-down for the full line of two, four, six and twelve inch models. While a special ratchet device on the six and twelve inch models resists tampering and makes adjustment of the spray simple.

4. Uneven flow from bubblers. Stop water waste caused by changes in water pressure from rolling terrains and friction loss with the new 1400 Series pressure compensating bubblers. Available in constant ¼, ½ and 1 gpm flow rates, the 1400 Series fills the gap between drip emitter flow rates in gallons per hour and sprinkler rates in gallons per minute.

5. Low head drainage. Rain Bird introduces a new water-saving 15103 SAM model. The "Seal-a-Matic"™ option on this new MINI-PAW prevents water waste from low head drainage caused by changes in elevation as great as 10 feet.

6. Overspraying. The new "Short Range" MINI-PAW 15103 SR



EM CAN GO DOWN THE DRAIN... TO AVOID IT!

eliminates water waste associated with over-spraying. Filling the performance gap where spray head coverage ends and small rotors begin, the 15103 SR offers low trajectory throw, low gallonage operation and an adjustable radius from 15 to 25 feet.

7. Wet corners. Eliminate over-watered corners with the new matched precipitation rate spray nozzles. Available in plastic or brass, the nozzles fit all Rain Bird 2800, 1800 and 171G Series pop-ups and plastic PA-8 and brass A-7G shrub adapters to provide uniform coverage.

8. Wind interference. The new Rain Bird P3-PJ sprinklers minimize problems caused by wind interference by throwing a single stream at a slope-hugging 15 degree angle. And with gallonage as low as 1.6 gpm, the precipitation rate resists slope run-off and puddling.

9. Sprinkling in the rain. Avoid the high cost and embarrassment of watering in a downpour with the new rain shut-off device from Rain Bird. When rain water reaches the adjustable sensing probes at a pre-set level, the shut-off device interrupts all power to the electric valves on the controller's next cycle. When the water evaporates, the system returns to normal operation.

10. Forgotten manual system. Left unattended, manual irrigation systems can be major water wasters. Conversion from manual to water-saving automatic control is simpler and more cost-effective with the new line of Rain Bird low cost residential valves. Highlighting the line is the AVA "Automatic Valve Actuator," available in three-quarter and one-inch models for conversion of many Rain Bird and competitive manual valves. Together with the PAS anti-siphon valves and the AGV automatic globe valves, Rain Bird provides the best in low cost residential controls.

Don't let your sprinkler system go down the drain. See your Rain Bird distributor for details of these and other exciting new product introductions. Write for our free Irrigation System Survival Kit at 145 N. Grand Ave., Glendora, CA 91740.

RAIN BIRD

® Rain Bird is a registered trademark of Rain Bird Sprinkler Mfg. Corp., Glendora, California.
© 1982, Rain Bird Sprinkler Mfg. Corp.

Circle No. 133 on Reader Inquiry Card

PIERIS, LEUCOTHOE, AND DAPHNE

BROADLEAF EVERGREENS FOR SHADED LOCATIONS

By DOUGLAS CHAPMAN

Pieris floribunda *is a dense, bushy evergreen with white flowers on upright panicles. It is tolerant of shade and high pH.*

The group known as broad-leaf evergreens is dominated by rhododendrons. But if one is considering diversity, ease of maintenance, and shade tolerance, then pieris, leucothoe, and daphne should highlight your shade plant list.

There are two pieris readily available—Japanese Pieris (*Pieris japonica*) and Mountain Pieris (*P. floribunda*). *P. japonica* is an upright, broad-leaf evergreen shrub, somewhat compact in habit, with spreading branches, reaching 6 to 8 feet in height and 5 to 6 feet in spread in central Michigan and 9 to 12 feet in height with a 6- to 8-foot spread in central Ohio.

This slow-growing ericaceous plant has lustrous dark green foliage during the summer months (formed in rosettes), that becomes somewhat dull in winter. When considering leaf color, the most exciting is rich bronze which the new growth displays during mid-April. The perfect, slightly urn-shaped white flowers are effective during mid-April. They are borne on 3- to 6-inch long pendulous panicles. During a cool spring, they can be effective in the landscape for two to three weeks. The flower buds are formed during mid-summer, taking on this pendulous habit which is extremely effective in the landscape for late summer and winter months.

The most significant problems as far as insects include mites and lace bugs—two sucking insects which can easily be controlled if they build up beyond an economic threshold. Diseases such as Phytophthora or leaf spots can become problems, but with the new pesticides, they are controllable.

This specimen broad-leaf evergreen is extremely effective in border plantings or as single specimen plants, grown in the shade with deep-rooted trees or other ericaceous plants.

Being ericaceous, it has a rather shallow-fibrous root system, rarely extending more than 18 inches into the soil. Therefore, *P. japonica* should be planted in moist, yet

Continues on page 48

Douglas J. Chapman is a Horticulturist at Dow Gardens, Midland, Michigan

Weather-matic Works

and works and works and works
works and works and works
day after day after day
week after week after week
month after month after month
year after year after year

Automatic landscape irrigation systems from Weather-matic are engineered and tested — and proved — to give years of trouble-free service. Costly callbacks for repairs and service seldom bother Weather-matic owners. And with the industry's finest selection of sprinkler heads and its most dependable valves and controllers, you can be sure to put exactly the right volume of water precisely where you want it, when you need it, without waste.

Insist on Weather-matic. Because it works.

You can't beat the system

Weather matic®
LAWN AND TURF IRRIGATION

Box 18205/Dallas, Texas 75218 214-278-6131

Circle No. 144 on Reader Inquiry Card

Daconil 2787.®
It's the
groundwork for
a more
playable
course.

For more and more superintendents that's the case. Because they know effective disease control is the best way to achieve a better looking, more playable course. And that's why Daconil 2787 fungicide is the basis of their fungicide spray program.

Number one on tees and greens.

Daconil 2787 is the product of choice on America's tees and greens.

The reason... Daconil 2787 works. It consistently delivers unsurpassed control of 9 turf diseases including dollar spot (and benomyl-resistant dollar spot), Helminthosporium (leafspot and melting out), red thread and large brown patch.

Fact is, Daconil 2787 is the broadest spectrum contact fungicide on the market today.

What's more, in 15 years of continuous use, there has never been a documented case of resistance. Even on courses where it was applied at weekly intervals for many years.

Outstanding on fairways.

Make Daconil 2787 the groundwork of your program for fairways too. It will deliver the same unequalled disease control it does on tees and greens.

And you need first rate protection on fairways. Because diseases are mobile and can easily spread from fairways to tees and greens. Especially dollar spot, brown patch and leafspot.

You can control these three major diseases on a wide variety of grasses all season long with Daconil 2787 without having to worry about burning fairway turf even in the hottest weather.

Easy and economical to use.

The flowable formulation of Daconil 2787 allows for fast, easy handling because it flows readily and disperses quickly. So there's no clogging of spray equipment.

And since Daconil 2787 has a built-in surfactant, you're assured of superior sticking power, extended coverage on the crown and sheath of grass blades and excellent fungicide retention even after heavy rains or watering.

All of which adds up to proven residual control when used at recommended rates.

When you consider everything Daconil 2787 has to offer, it's no wonder more and more superintendents are making it the basis of their disease control program. On tees, greens, fairways and even ornamentals.

With a full and regular schedule of Daconil 2787, your turf will be healthier and more vigorous to better withstand traffic and play. And it makes for easier weed control too.

Groundwork like that adds up to a more playable course. And in your business, that's the name of the game.

Diamond Shamrock
Agricultural Chemicals Division
Diamond Shamrock Corporation
1100 Superior Avenue
Cleveland, Ohio 44114

Always follow label directions carefully when using turf chemicals.

Circle No. 113 on Reader Inquiry Card

Lencothoe transplants easily *but is sensitive to late winter dessication. It is a colorful understory plant.*

well-drained acid soils high in organic matter.

It is extremely effective when planted in partial or full shade locations. Pruning is rarely required, making this plant relatively maintenance free.

Mountain Pieris (*P. floribunda*) is an exciting evergreen shrub, bushy in habit, low and rounded, rarely getting over 3 to 6 feet in height and width. It is extremely dense.

The white flowers, which are quite fragrant, are borne on 2 to 4-inch panicles that are held quite upright. One should expect to see this shrub flowering during mid to late April. It can be extremely effective for two to three week periods during cool, moist springs.

Like the Japanese Pieris, it grows well in high organic, acid, well-drained soils but is extremely tolerant of higher pH's. It is outstanding as a specimen or mass-planting.

This ericaceous shrub grows well in companion with deep-rooted plants, such as pine, spruce, or oak. Of the two pieris, Mountain Pieris is least available, yet for American gardens, it is probably best suited. It requires little maintenance, being a rather upright shrub, rarely succumbing to insect and disease problems. Further, it grows well in a range of pH from 4 to 6.5.

Drooping Leucothoe (*Leucothoe fontanesiana*) is perfect for almost any naturalized or woodsy landscape. It is probably best grown in a container or planted with companion trees, such as pine or oak.

Leucothoe is a low-spreading with somewhat arching habit, graceful plant, reaching 3 to 5 feet in height and 4 to 6 feet in width. The new growth is bright lime-green, becoming a rich dark green during summer which changes to a light bronze color during the winter months. The flowers, in central Michigan, are not seen until late May and are white, perfect, fragrant, and borne in long axillary racemes under the foliage, accenting the arching-pendulous habit of this shrub.

Leucothoe transplants easily, thriving in well-drained, high organic acid soils. It is particularly sensitive to desiccation by wind or bright sunlight during late winter. Therefore, it must be grown in woodsy settings. Drooping Leucothoe is outstanding as a park plant or in naturalized areas in individual home landscapes.

There are two daphnes which are readily available while being almost opposites. Rose Daphne (*Daphne cneorum*), a small, ground coverlike plant, and February Daphne (*D. mezereum*), a shrub.

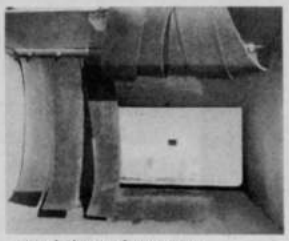
Rose Daphne is a small, low-spreading evergreen shrub, reaching only 6 to 10 inches in height and 2 feet in width. It is most effective in the home landscape, be it in a rock garden or as a woodsy, almost wild flower plant.

Continues on page 50

New powerful brush chipper solves your "safety brake" problems!

Ever practice slamming the "safety" brake on a 3000 r.p.m. brush chipper? Don't, because you won't like what you hear. The Vermeer 1600 Brush Chipper introduces a better way. Shuts off the feed to the cutting rotor without "slamming the brake." It's called the feed stop gate, a 5/8" thick spring-loaded gate that drops in front of the rotor...*in approximately .5 of a second.* Easy access activator bars trip the gate, shut down the ignition and cut off the power to the rotor. Less stress. Instant feed stop. Longer chipper life. Want more information? See your local Vermeer dealer today.

Close up photo shows the wide 16 in. throat of the 1600 Brush Chipper



...And the safety gate "stop action" ½-second later.

Call today!*
(800) 247-2347
**(In Iowa, call collect (515) 628-3333)*

Vermeer THE DIGGIN' DUTCHMAN

Vermeer Manufacturing Company
8805 New Sharon Road, Pella, Iowa 50219

Circle No. 143 on Reader Inquiry Card

EVERGREENS *from page 48*

D. cneorum is shade-liable, that is, it must be grown in shady locations. It does extremely well as a companion where rhododendrons are effective. The small leaves are almost needle-like. Being a lustrous green throughout the summer they become an almost dull grey-green through the winter months. The bright pink fragrant flowers often appear during late April or early May.

Some have observed flowering a second time during late summer. These flowers are similar to *Iberis sempevirens*—rather tight clusters, being pink in color.

Rose Daphne is best grown in a container. It transplants successfully when planted in early spring. It should be grown in well-drained high organic soil with a pH somewhere between 6 and 7. If the area is exposed to southwest sun or wind, Rose Daphne soon declines.

The key is planting in medium shade, giving a north to northeast exposure and well-drained soil. This plant is best when used as a detailed or intimate plant in home landscapes while rarely having a place in the commercial or golf course setting.

February Daphne (*D. mezereum*) is a deciduous shrub with erect branches, reaching 3 to 5 feet in height and width. It is most effective when grown in partial to full shade. In central Michigan, one can expect the lilac or magenta fragrant flowers to appear during early to mid-April. The fruit, which is about ⅓ to ½ inch in diameter, is brilliant red and matures in June.

Of the *D. mezereum* cultivars, the most outstanding is *D. mezereum* 'Alba' which has pale yellow to white flowers and exciting yellow fruit. This yellow fruit can be outstanding during summer and fall. The leaves are rosettes near the terminal.

February Daphne does well in high organic, loamy, well-drained soils. It is perfectly hardy to 20 degrees below zero. This shrub has been grown or cultivated in the U.S. since colonial days and naturalizes well. One should consider it not only an outstanding specimen or mass planting shrub in the individual home landscape but also one that integrates well into commercial or large-area landscapes as a companion plant for deep-rooted medium-large trees, be they deciduous or evergreen. It is a plant that does extremely well when planted with a north to northeast exposure.

Pieris, leucothoe, and daphne are outstanding broad-leaf evergreens. Certainly leucothoe, with its somewhat pendulous, shrubby habit; *P. floribunda*, which holds its flowers in a very formal, upright manner; and February Daphne are outstanding in woodsy plantings. Rose Daphne is almost insect- and disease-free, yet a plant that wants to be grown in areas where it receives little or no foot traffic. Foot traffic or heavy use areas soon lead to plants declining. If one has that intimate woodsy location, these three genera are a must to consider.

WTT

Finally, An Aid For Teaching Turfgrass

Superintendents, Contractors, Lawn Care Managers, New, On-the-Job Reference. The Turf Managers' Handbook is a comprehensive, organized approach to turfgrass science and care. It has been designed and written by leading turf specialists from Purdue, Dr. William Daniel and Dr. Ray Freeborg, for on-the-job reference and as a text for students.

The book contains 150 illustrations and 96 color photographs. Data includes 240 tables and forms. Included are specifications for rootzones, employment, calculations for chemical applications, and extensive metric-imperial conversion. Business and technical aspects of turfgrass management are covered in this 424-page book. Planning, purchasing, hiring, construction, and plant selection are put together for easy on-the-job reference. Markets covered include lawn care, sod production, golf course management, cemeteries, athletic fields, and low maintenance areas. If it concerns turf, it's in the Turf Managers' Handbook.

TURF managers' HANDBOOK

Ordering Information

Please send _____ copies of the hardback ($18.95* ea.)
_____ copies of the paperback ($14.95* ea.)

*Please add $3.00 per order plus $1.00 per additional copy for postage and handling.

Please charge to my Visa, Master Card or American Express (circle one)
Account Number_____Expiration Date _____
A check or money order for _____ is enclosed.
I understand that delivery may take six to eight weeks.
Quantity and bookstore rates available upon request.

Signature_____
Name (Print) _____
Address _____
City _____State_____Zip_____

Send to:
Book Sales
Harcourt Brace Jovanovich Publications
One East First Street
Duluth, MN 55802

HBJ

WTT 52

WE REACH THE PEOPLE YOU NEED TO REACH!

Place a recruitment ad in any of these HARCOURT BRACE JOVANOVICH PUBLICATIONS - and you know your ad dollar is wisely spent.

HBJ PUBLICATIONS does a better job of reaching those who count *(your potential employees)* than any other business publisher.

Magazine	Circulation
Body Fashions/Intimate Apparel	8,984
Dental Laboratory Review	17,265
Dental Management	101,645
Drug & Cosmetic Industry	7,426
Electronic Technician/Dealer	43,041
Fast Service	50,378
Flooring	13,032
Food Management	49,723
Hearing Instruments	17,002
Home & Auto	22,424
Hotel & Motel Management	36,360
Housewares	12,678
Industrial Education	45,096

Magazine	Circulation
LP/Gas	13,664
Lawn Care Industry	12,178
Neurology	12,600
Paper Sales	12,061
Pest Control	14,624
Professional Remodeling	36,076
Quick Frozen Foods	20,721
Rent All	11,136
Roofing/Siding/Insulation	18,459
Snack Food	9,196
Toys Hobbies & Crafts	14,196
Weeds Trees & Turf	42,375

Don't forget that classified advertising works just as effectively in locating employees as it does if you are looking for a position, have a line, machinery or a business to sell, are seeking representatives or wish to buy a specific item. Let it go to work for you!

HBJ PUBLICATIONS - COUNT ON US TO REACH THOSE WHO COUNT!

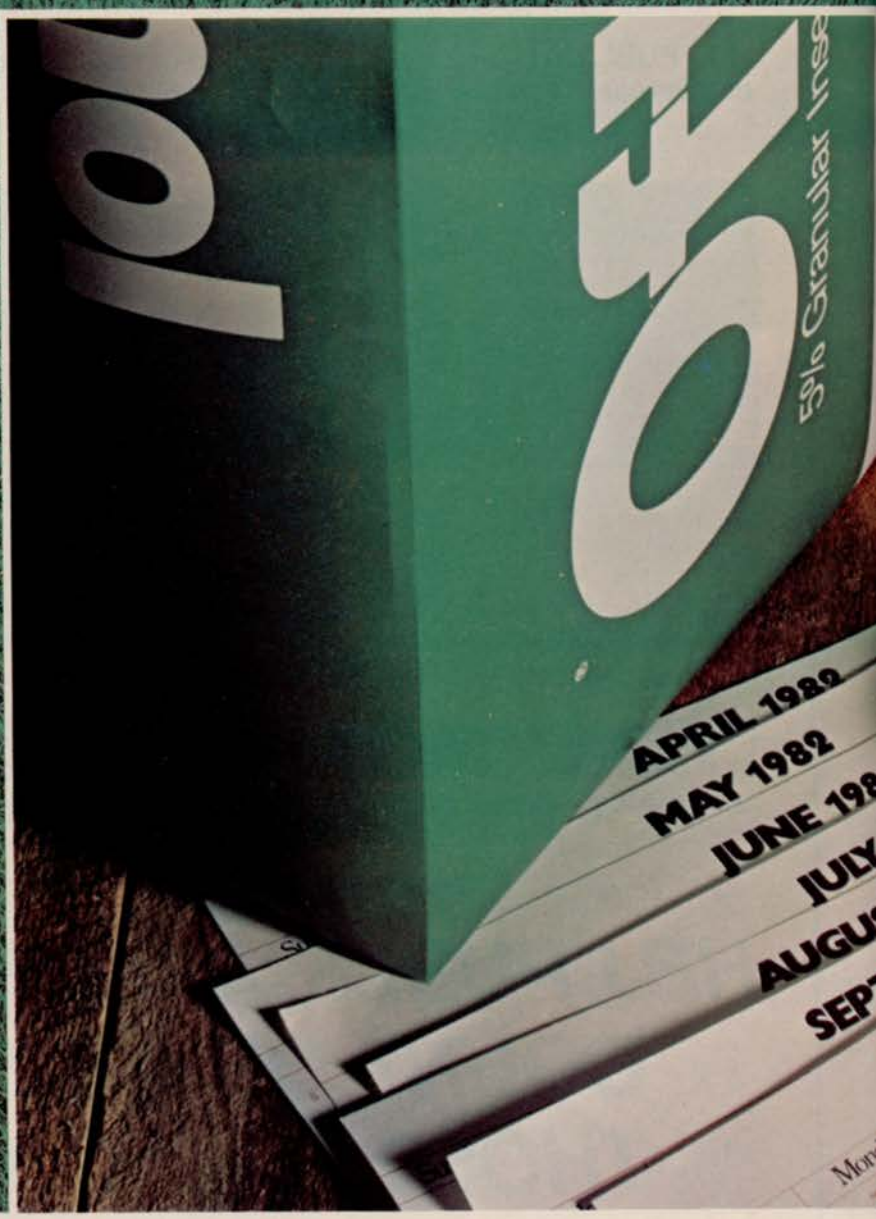
HBJ

Harcourt Brace Jovanovich Publications
One East First Street
Duluth, Minnesota 55802

Call Dawn Anderson at 218-727-8511

A

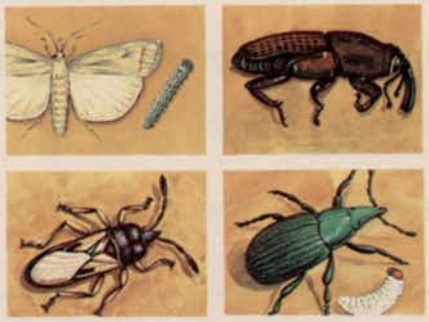
®OFTANOL. One shot. No other insecticide controls white grubs so well for so long.



The use of OFTANOL for turf pest control is registered in many states. Check with your state extension office for registration information.

One-shot white grub control with OFTANOL represents a dramatic breakthrough in turf management.

With a single application at the recommended rate, OFTANOL controls white grubs through the entire season.

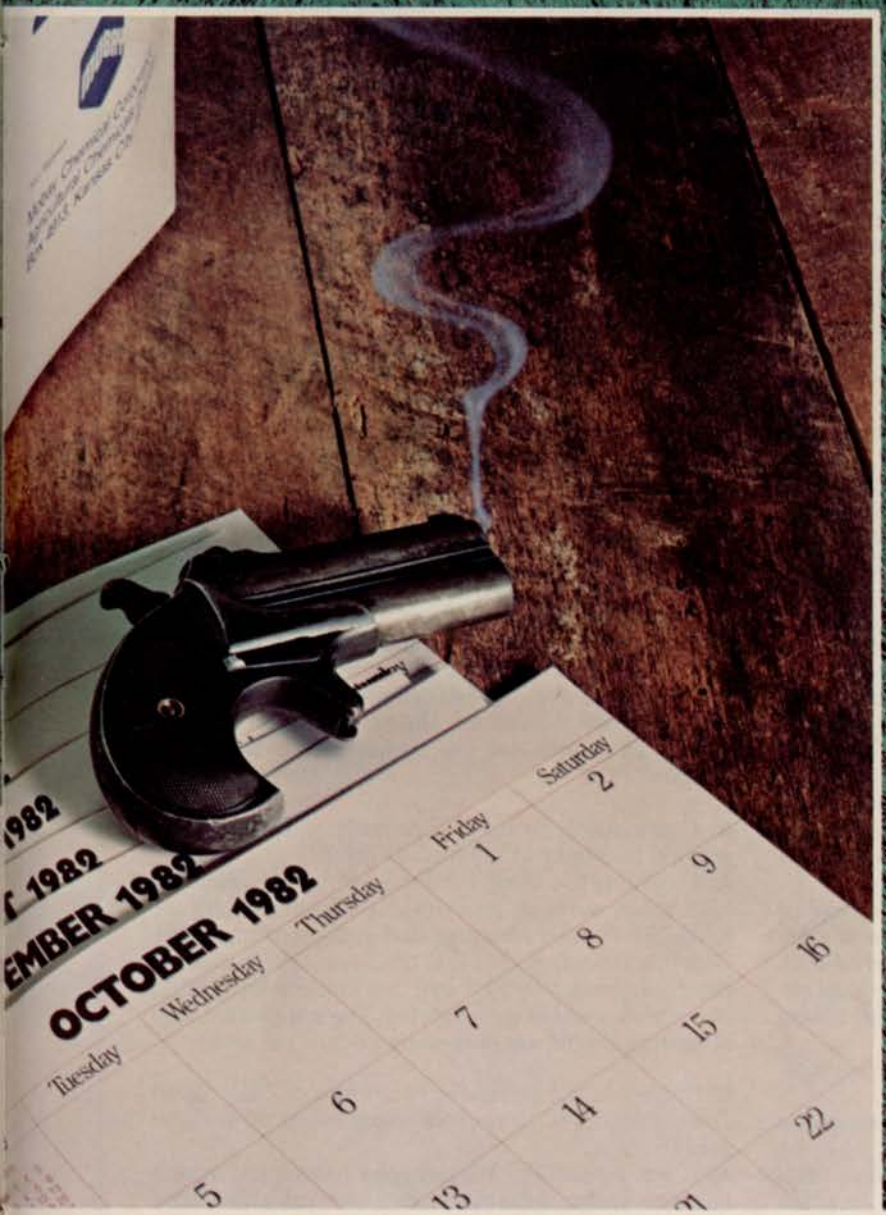


But that's only part of the story.

Properly timed, that same application can also control major insects such as billbug, chinch bug, Hyperodes weevil and sod webworm.

For example, apply OFTANOL for the first infestation of surface feeding insects. You'll establish season-long white grub control at the same time.

82101 SPG



And it doesn't stop there!

Or, treat for Hyperodes weevil in the spring. You'll also receive white grub control for the entire season.

Other insecticides requiring multiple applications can't provide this performance and flexibility.

OFTANOL has other advantages, too: won't tie up in thatch . . . resists leaching . . . doesn't require watering in.

No wonder OFTANOL is the new insecticide turf managers are asking to learn more about. OFTANOL can fit into your insect control program, too. Ask your turf chemicals supplier for this free OFTANOL FACTS brochure.

Circle No. 124 on Reader Inquiry Card

Don't trust your turf to anything less.

Mobay Chemical Corporation
Agricultural Chemicals Division
Specialty Products Group
Box 4913, Kansas City, MO 64120

OFTANOL is a registered TM of the Parent Company of Farbenfabriken Bayer GmbH, Leverkusen.

VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: *What causes the galls on the stems of oleander, and how can we control them? (Florida)*

A: Both fungal and bacterial galls have been reported on oleander but, unfortunately, neither can be controlled with chemicals. Cut off and destroy the infected parts, and sterilize the pruners between each cut with alcohol or clorox.

Q: *Stripe smut is the number one problem in our area. I would appreciate knowing the latest practices for controlling this disease on homeowner lawns. (Ohio)*

A: Stripe smut disease called by Ustilago *striiformis* (West.) is the most common systemic disease of Kentucky bluegrass (*Poa pratensis* L.) in the United States and is considered to have no good control. The success or failure of a disease management program is dependent upon prompt diagnosis and the proper timing and application of fungicides as well as proper cultural practices.

The first symptoms are long, parallel, yellowish streaks on leaf blades which darken as the disease progresses. Blades finally rupture, exposing black, sooty spores after which the shredded blades turn straw-colored, shrivel and collapse.

The fungus reactivates in spring or fall resulting in gradual decline of turf. Intensive irrigation and fertilization can promote progressive decline by thinning the turf. There is some evidence that sodded lawns decline faster than seeded lawns. Diseased areas may be from an inch to more than a foot in diameter.

Some of the factors contributing to the progress of stripe smut are susceptible cultivars, heavy thatch, cool temperatures (50°-60°F.), intense irrigation, and heavy fertilization.

New growth can be infected by systemic spread of disease. Best control can be achieved by use of relatively resistant Kentucky bluegrass cultivars, moderate cultural practices and use of fungicides. Your local extension service should be able to help you select cultivars best suited to your area.

For established turf in home lawns, proper management practice should minimize the disease.

Do not overfertilize or irrigate turf heavily where the disease is present.

Systemic fungicides, such as benomyl (Tersan 1991) and the thiophanates (Clearly 3336, Fungo 50), applied once or twice in early spring and mid-to-late fall and heavily watered into the soil for maximum absorption by the roots, may prevent but will not eradicate the disease.

There is some evidence that the stripe smut pathogen (fungus) may develop resistance to systemic fungicides. Therefore, use a single application in the spring and fall if possible, but do not exceed two applications in either season. READ THE LABEL AND FOLLOW THE DIRECTIONS.

Q: *How effective are the fluid limestones that are being used by some lawn care companies? (Pennsylvania)*

A: Fluid limestones contain limestone particles ground to a fineness of at least 200 mesh and clay to help keep the limestone in suspension.

The effectiveness of any limestone in neutralizing soil acidity is dependent upon its carbonate content and particulate size. Limestones coarser than 20 mesh are very slow to react and have limited value in turf management; limestones finer than 100 mesh react within several weeks after application.

Because of their fineness, fluid lime reacts very quickly. However, dry limestone of the same fineness will react at the same rate.

Fluid limestone has two advantages over the use of dry limestone: it can be spread more evenly and has no dust problem. The biggest disadvantage is the volume of material handled. Since a fluid limestone mix will contain about 50% limestone, it requires twice as much on a weight basis as an equivalent limestone applied dry.

Q: *What do you think about the new plastic foam sheets to protect container stock during winter? (Ohio)*

A: In 1979, Dr. Gouin, Professor of Horticulture at the University of Maryland, reported that conventional techniques of overwintering container-grown plants cost about four times more than protecting plants with polypropylene microfoam sheets. I suggest that you contact Dr. Gouin for the current status of his research.

Q: *Can siduron be used to prevent crabgrass when seeding Kentucky 31 tall fescue? (Idaho)*

A: According to a study conducted at the University of Nebraska, siduron can impair establishment of Kentucky 31 even when applied at the recommended rate. It is recommended that the Kentucky 31 seeding rate be increased by 10% and that the seed be applied as early as possible in the spring. The application rate of siduron should not exceed six pounds per acre.

Q: *Could you tell me where I can buy a product called Deer Away? Will it protect young conifers? (Michigan)*

A: If you contact the Weyerhaeuser Company which has been assigned the patent for Deer Away, I am sure they could provide the name of the nearest distributor. We have not tested Deer Away, but it is registered with the EPA as a deer repellent for conifers, seedlings, ornamental plantings and orchards.

Send your questions or comments to: Vegetation Management c/o WEEDS TREES & TURF, 757 Third Avenue, New York, NY 10017. Leave at least two months for Roger Funk's response in this column.

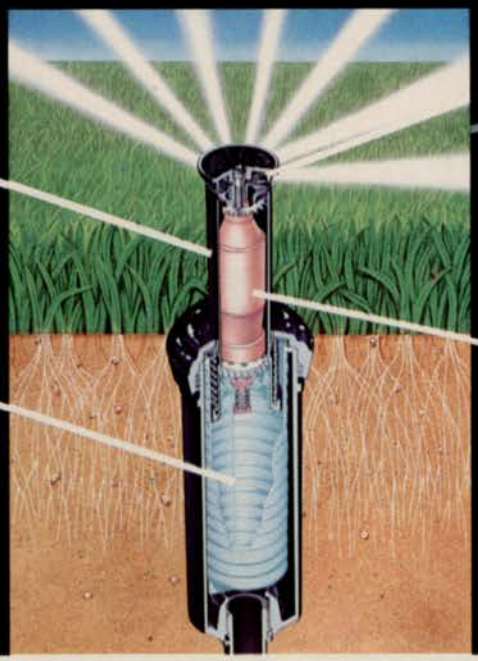
NOW . . . all the advantages of TORO® Stream Rotors at a new lower price!

3" pop-up for medium size turf areas

No back splash; quiet; no disturbing impact noise

Large-area filter screens (more than 20 sq. in.) prevent clogging

Covers large areas with low G.P.M.; fewer valves, less trenching, fewer controller stations



Nozzles seal when retracted

Low precipitation rate —less run-off, less waste, more even distribution of water

Gear drive is vacuum packed with oil, sealed, and isolated from water

Constructed of Cycolac,® Stainless steel and isolated from water

Cycolac® is a registered trademark of Borg Warner

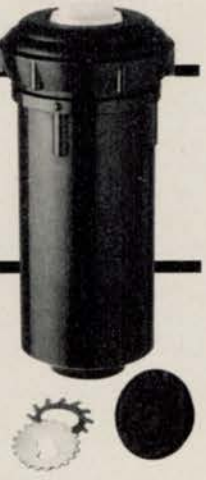
Contractors enjoy money-saving advantages

Because each job you install requires its own combination of patterns, we now sell 3" pop-up Stream Rotors without nozzles or arc discs. Heads come with a fitted plug to keep debris *out* . . . keep seals *in*. You assemble the heads with exactly the nozzles you need, working right out of the case. No need to maintain a product mix, tying up your money in inventory. Makes installation easier, too. Saves time, saves money. It's easier for us, too . . . so we've *lowered* the price to make it an even better deal. You're a double winner when you specify TORO Stream Rotors, utilizing our new unassembled models. If you prefer, they're still available assembled, too.

SAVE $2.00 *

WHEN YOU COMBINE THE BODY, NOZZLE, AND ARC DISC YOU NEED

*Off manufacturers suggested list price; subject to dealer option



For more information, see your TORO distributor or write:

THE TORO COMPANY, Irrigation Division
Dept. WT-582, P.O. Box 489, Riverside, CA 92502

TORO®

Circle No. 141 on Reader Inquiry Card

NEW SEVIN® SL. IT'S EASY TO USE & EASY TO LIVE WITH.

Convenience. New SEVIN® SL carbaryl insecticide really pours it on.

For you, that means convenient, easy handling. Because SEVIN SL is a water-based liquid that's a snap to measure and mix. Clean-up's easy, too.

SEVIN SL comes in light-weight 2½ gallon jugs, so it's easy to pick up and pour.

Like other SEVIN carbaryl formulations, you can combine new SEVIN SL with most any fungicide, miticide or insecticide. Or use it alone to control over 120 pests that attack trees, shrubs, flowers and turf.

SEVIN SL carbaryl is convenient for people who use your grounds, too.

As soon as SEVIN SL spray dries, they're free to enjoy the area. Because, compared to other insecticides, biodegradable SEVIN SL carbaryl ranks low in toxicity to people, animals, birds and fish. And it leaves no lingering harsh odor.

Get confidence—and convenience—with new SEVIN SL.

For more information about SEVIN SL and SEVIN 20% Bait carbaryl insecticide—a new formulation for cutworms and mole crickets—contact your pesticide supplier.

Sevin® SL
CARBARYL INSECTICIDE
UNION CARBIDE

IS THE ANSWER.

UNION CARBIDE AGRICULTURAL PRODUCTS COMPANY, INC.
P.O. Box 12014, T.W. Alexander Drive
Research Triangle Park, NC 27709

SEVIN is a registered trademark for carbaryl insecticide. As with any pesticide, always follow instructions on the label.

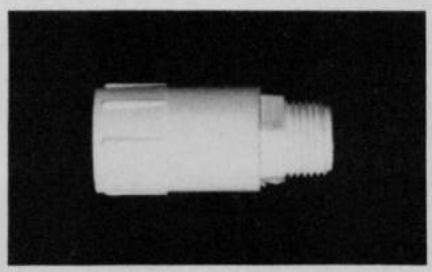
Circle No. 142 on Reader Inquiry Card

PRODUCTS

Excel now has a propane powered turf and grounds maintenance machine. The machine is run on a 21.5 hp Kohler engine designed to operate on low cost propane. The simplified fuel system of the Hustler 275LPG requires less up-

keep than a gasoline engine. The available attachments include a 72-in., three way mowing deck, a 72-in., side discharge deck, a 72-in. heavy duty deck, 60-in. V blade, 54-in. snow thrower and a 60-in. rotary broom.

Circle No. 148 on Reader Inquiry Card



King Brothers has developed a device to prevent the theft of valuable sprinkler heads. The plastic Head-Lok fits between the riser and the sprinkler head below grade and swivels when vandals try to remove the head from above ground. The Head-Lok comes in ½-in., ¾-in. and 1-in. sizes.

Circle No. 149 on Reader Inquiry Card

Midmark Corp. has the 440 hydrostatic trencher with a 44 hp diesel engine. Available with either a 43,000-lb. or a 70,000-lb. digging chain, it can create a trench as wide as 18-in. and as deep as 72-in. The 440 also backfills with ease because the operator has a clear view of the trench and the six-way blade control can raise angle or tilt blade as needed. The 440 can be equipped with a boring Work Mate which will bore up to 4-in. in diameter without disturbing the surface.

Circle No. 150 on Reader Inquiry Card

Bermuda King has designed a special sprig planter for golf course fairway planting and landscaping. The Fairway Special can lay down up to 300 bushels of sprigs per acre, of all sorts of vegeta-

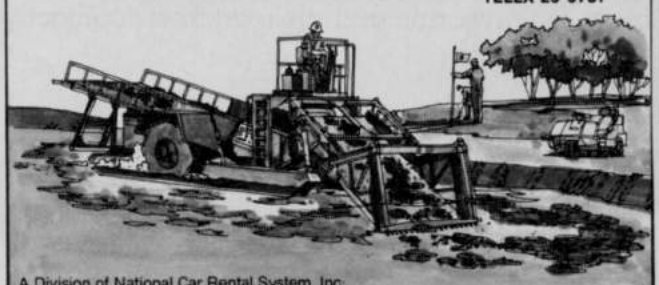
Continues on page 60

Clean Up Lakes, Ponds, River Fronts.

New Aquatic Weed Harvester removes both floating and submerged weeds to restore natural ecological balance and preserve fish habitat. Two independently controlled paddle wheels resist clogging even in heavy golf pond weed beds . . . unsurpassed maneuverability even around marina docks. Floats in inches of water, permitting cutting close to shore. Rotating vertical side feeders direct weeds into automatic conveyor to keep cuttings from floating away. Easily trailered from pond to pond without damaging turf. Backed by Mud Cat's international reputation for reliability and ease of operation.

MUD CAT
NATIONAL CAR RENTAL

P.O. BOX 16247, ST. LOUIS PARK, MINN. 55416 U.S.A.
IN U.S. CALL TOLL FREE 800-328-7333
INTERNATIONALLY, OR FROM MINNESOTA PHONE 612/893-6400
TELEX 29-0767



A Division of National Car Rental System, Inc.

Circle No. 127 on Reader Inquiry Card

M-C MATHEWS COMPANY

Lawn Genie pick-up mower

Saves work all year 'round

- Spring - Thatches, renovates and picks up in one pass
- Summer - Mows and loads clippings in quick-dump hopper
- Fall - cleans up leaves, twigs and trash

Change mowing or thatching blades in seconds with M-C's patented hanger design.

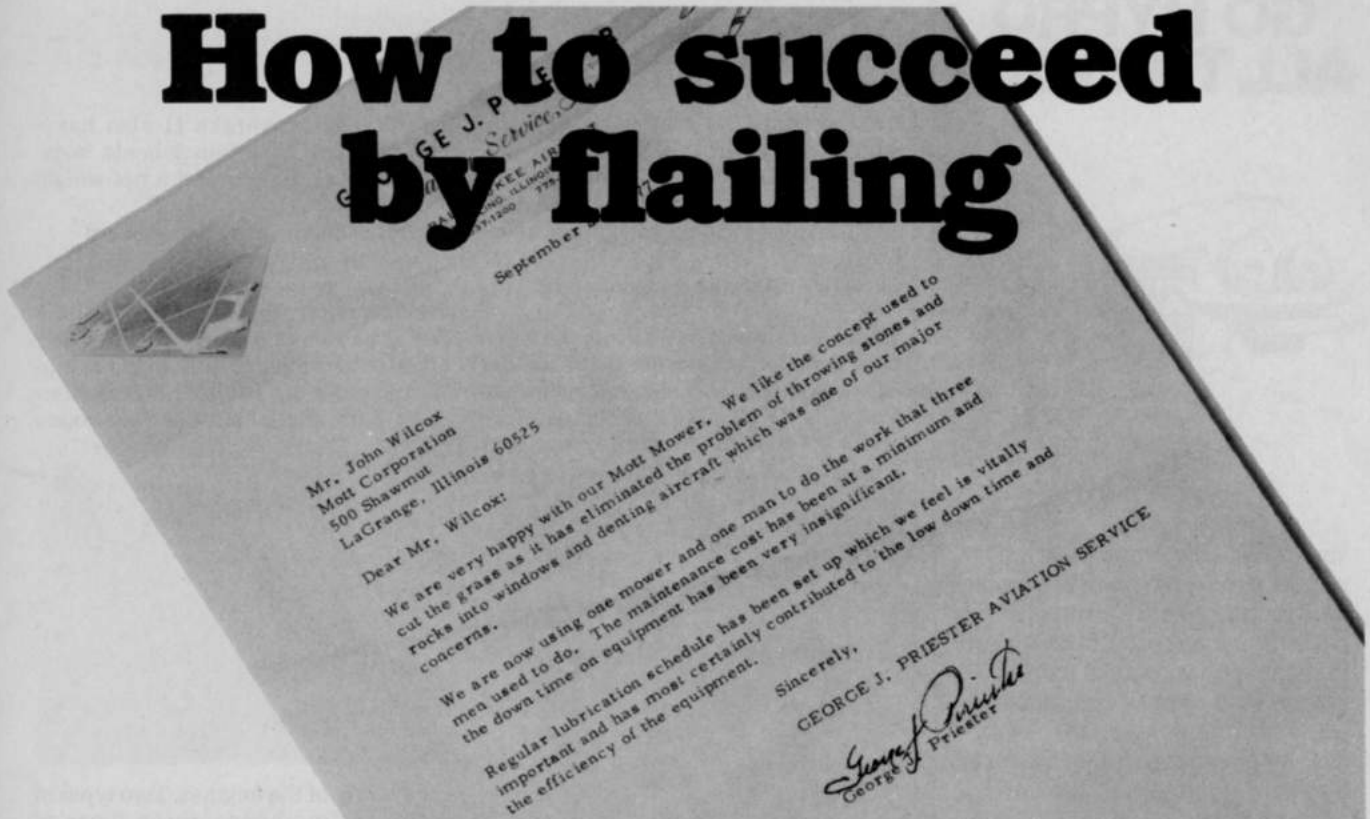
Four cutting widths from 36" to 72", engine driven or P.T.O.

Call or Write Today
Mathews Company
P. O. Box 70
Crystal Lake, IL 60014
815/459-2210

Iron Horse Quality Equipment

Circle No. 122 on Reader Inquiry Card

How to succeed by flailing



September

Mr. John Wilcox
Mott Corporation
500 Shawmut
LaGrange, Illinois 60525

Dear Mr. Wilcox:

We are very happy with our Mott Mower. We like the concept used to cut the grass as it has eliminated the problem of throwing stones and rocks into windows and denting aircraft which was one of our major concerns.

We are now using one mower and one man to do the work that three men used to do. The maintenance cost has been at a minimum and the down time on equipment has been very insignificant.

Regular lubrication schedule has been set up which we feel is vitally important and has most certainly contributed to the low down time and the efficiency of the equipment.

Sincerely,

GEORGE J. PRIESTER AVIATION SERVICE

George J. Priester

GJP:e

Read how others did it with MOTT flail mowers.

• Mow fine lawns • Shred weeds • Mulch leaves • Renovate
at lower cost through longer life with greater safety!

Improve your grounds maintenance operation with MOTT Flail Mowers. Call or write today for your free brochure, "How to Succeed by Flailing."

T-38
38" pull type, self-powered, gangable to 9'

38", 48", 60"
For tractors up to 25 PTO h.p. maximum

Heavy Duty
48", 60", 72"
fine cut only, reversible

Super Heavy Duty
48", 60", 74", 88"
fine or coarse cut for higher h.p. tractors.

Interstater®
Gangable to 21'
fine or coarse cut

mott® HAMMER KNIFE®

the original safety flail mowing system

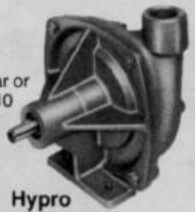
MOTT CORPORATION

500 Shawmut Avenue • P.O. Box 518 • LaGrange, Illinois 60525 • (312) 354-7220

GO HYPRO ALL THE WAY!

You get reliable pressure at the nozzle with Hypro sprayer pumps and accessories. That means time savings and application precision that can help you make more money. And Hypro dependability will keep your sprayer on the job, season after season. Get the facts. See your Hypro distributor or write us today.

Hypro Series 6500 Roller Pumps.
PTO or engine drive. Choice of rollers, seals and housings. Strong 6-roller performance, low maintenance. Outputs to 22 gpm. Pressures to 300 psi. Speeds to 1200 rpm.



Hypro High Speed Centrifugal Pumps.
Belt drive. Models also available for hydraulic, gear or engine drive. Outputs to 210 gpm. Pressures to 170 psi. Speeds to 6000 rpm.

Hypro Series 5200 Piston Pump.
Two sizes: 6 gpm or 10 gpm, both with 400 psi power. Two cylinder. Electric motor, gas engine or PTO drive. Speeds to 800 rpm. Other Hypro piston pumps with outputs to 26 gpm.

Hypro Accessories.
Complete line of gauges, strainers, agitators, ball valves and couplings, valves and fittings to make your job easier.

Send for your free Hypro catalog today.

Hypro®
A DIVISION OF LEAR SIEGLER, INC.
347 Fifth Ave NW. St. Paul. MN 55112 • (612) 633-9300

Circle No. 118 on Reader Inquiry Card

tive material. The planter has 36 large wheels that insert the sprigs to the desired depth in 2-6 in. row spacings. The planter also has heavy duty spindles and bearings for high speed and highway towing.

Circle No. 151 on Reader Inquiry Card

Racal Airstream is manufacturing a new supplied-air system that provides head, eye, face and respiratory protection. The AH38 has an air temperature valve to cool the breathing air. The

valve clips onto the wearers' belt for easy accessibility. The new valve increases the Airstream range of supplied air system module and accessory combinations.

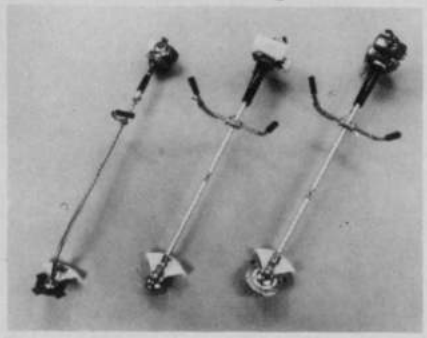
Circle No. 152 on Reader Inquiry Card

F.D. Kees presents a compact version of the Kees Powerake, the Powerake II. Designed with a fold down handle for transport, it is rugged enough has a 3-hp Briggs and Stratton engine. The non-tracking feature of the rate provides a complete action over the 14.5-in. raking

swath. The Powerake II also has a 14.5-in. wheel base, 6-in. wheels, ¾-in. length raking fingers and a net weight of 80 lbs.

Circle No. 153 on Reader Inquiry Card

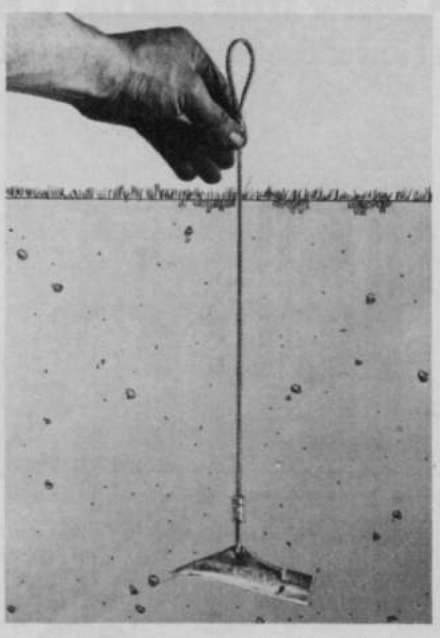
Vandermolen now has the Windmill line of gasoline powered trimmers and brush cutters available. Both the 32 and 35 cc models are run by Kawasaki engines with shaft housings that rotate



indepently of the engines. Two types of nylon cutting heads, three types of metal heads and saw blades are available for the Windmill trimmers.

Circle No. 154 on Reader Inquiry Card

Foresight Industries introduces the Duckbill Earth Anchor in three sizes. The anchor holds 10,000 times its own weight and requires no stems or rods. Useful for securing trees and equip-



ment, the anchor can be installed by driving it into the ground with a hammer and drive rod. Made of aluminum alloy, the Duckbill meets all government and insurance specifications.

Circle No. 155 on Reader Inquiry Card

Continues on page 62

This magazine gives you good reading, good writing and good arithmetic.

We present the information in our articles clearly, accurately and objectively. That's good writing. Which means good reading.

We present the information in our circulation statement clearly, accurately and objectively. That's good arithmetic.

BPA (Business Publications Audit of Circulation, Inc.) helps us provide precise and reliable information to both advertisers and readers.

An independent, not-for-profit organization, BPA audits our circulation list once a year to make sure it's correct and up to date. The audit verifies your name, your company, your industry and your job title.

This information enables our advertisers to determine if they are reaching the right people in the right place with the right message.

The audit also benefits you. Because the more a publication and its advertisers know about you, the better they can provide you with articles and advertisements that meet your information needs.

BPA. For readers it stands for meaningful information. For advertisers it stands for meaningful readers. Business Publications Audit of Circulation, Inc.
360 Park Ave. So., New York, NY 10010.

BPA

We make sure you get what you pay for.

Kut-Kwick Corp. outfront rotary mower has the maneuverability to cut and trim as a hydrostat as well as the reliability of a gear type transmission. The operator is ensured high degree of

safety by being seated in the rear of the mower, and also has an unobstructed view of the work area. With cutting swaths of 36-in., 48-in. or 60-in., the mower has rack and gear steering and a semi-rigid deck design.

Circle No. 156 on Reader Inquiry Card

Toro is announcing a new liquid hydraulic oil dye, Toro P/N-44-2500. Developed for use on turf maintenance equipment, the dye gives the hydraulic oil a red color for easy detection of leaks before a green area is severely damaged. The dye has been approved by suppliers of hydraulic components and does not affect the performance of the equipment. The oil is packaged in a 20 milliliter bottles which should be sufficient for a four to six gallon reservoir.

Circle No. 157 on Reader Inquiry Card

Deer-Away now offers Keep-Away Tree Worm Tape as a barrier against crawling insects, worms and larvae. The tape has an outer surface of slippery Mylar film and a backing of mastic adhesive protect by a peel off liner. The

Mylar prevents insects from crawling over the tape and the adhesive effectively bars them from getting under the tape. The adhesive will not dry out and contains no toxic chemicals. It comes in 20 ft. rolls, in 2- or 3-in. widths.

Circle No. 158 on Reader Inquiry Card

Ditch Witch has introduced the model 350SX lawn plow for underground installations at depths of 12-24 inches. The rigid frame machine is available

with either gasoline or diesel powered engine. It has an operator's station, four wheel steering, and variable speed shaker control. Blades are available to lay television cables, power and communications cables and pull plastic pipes.

Circle No. 159 on Reader Inquiry Card

Continues on page 66

Heavy-duty features, lightweight price.

Hoffco WT-14H: A Tri-Kut™ steel-bladed weed trimmer/cutter, a monofilament grass trimmer/edger. Strong 13.8cc engine. Patented drive shaft system. Shoulder strap/hip pad and grass/dust shield included.

TOUGH ON THE JOB. EASY ON YOU.

Hoffco, Inc. • Dept. WTT-582 • 358 N.W. F St. • Richmond, IN 47374

Circle No. 116 on Reader Inquiry Card

Put a WHIRLWIND FORCE to work to SWEEP UP LEAVES, LITTER, etc!

TAKE-ALONG 'BIG JOB' LOADER

HAUL THIS 16 horsepower Mi-T-VAC on any truck (or trailer we make) and clean up wet or dry problems. Fills dump truck with leaves in 25 minutes!

Lo-Blo, the Air-BRoom®

HEAVY DUTY BLOWER-SWEEPER helps a small crew gather more leaves, trash, clippings in less time. For details on today's 5 to 45 horsepower models, call Area 216 **947-2344.**

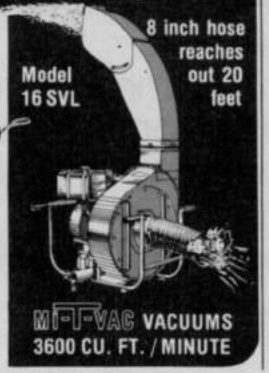
ATWATER STRONG DIVISION MODEL BK

BOX 68 · ATWATER, OHIO 44201

LAWN EQUIPMENT SINCE 1949

Model 16 SVL

8 inch hose reaches out 20 feet



MI-T-VAC VACUUMS 3600 CU. FT. / MINUTE

Circle No. 103 on Reader Inquiry Card

10 volumes - $525.00

THE NEW YORK BOTANICAL GARDEN ILLUSTRATED ENCYCLOPEDIA OF HORTICULTURE
by Thomas H. Everett

This authoritative, up-to-date horticultural reference's material, language and style meet the needs of both the amateur and the professional.

These volumes are compiled in an easy-to-use encyclopedic format with Latin/popular name cross referencing. You get 20,000 species...3600 genera...2500 cross references...10,000 photographs...and more! Also included are...

- plants and plant lore
- effective growing techniques
- handling pests
- and many other practical problems!

Slated to be the standard reference source in the field of horticulture. **ORDER YOUR SET TODAY!**

Send to: Book Sales, Harcourt Brace Jovanovich Publications
One East First Street, Duluth, MN 55802

YES! Send me _____ set(s) of THE NEW YORK BOTANICAL GARDEN ILLUSTRATED ENCYCLOPEDIA OF HORTICULTURE at $525.00 per set.

Payment must accompany order.

Signature _____ Date_____

Name_____

Street Address_____

City _____ State_____ Zip_____

Phone _____

Please allow 6-8 weeks for delivery.

Presenting the aerators designed in the belief that all grounds are not created equal.

Some grounds are flat. Some are not. So how can you expect one aerator to work equally on both?

You can't. That's why Ryan designed the Tracaire® *and* the Renovaire®.

The Tracaire's 12-tine wheels are held in perfect horizontal alignment for uniform aeration on athletic fields and other flat areas.

The Renovaire features independently-mounted tine wheels that hug the turf and deliver maximum penetration on irregular terrain like golf courses and parks.

Both aerators give you a wide 6′ swath and a choice of interchangeable tines (coring, slicing and open spoon) to match your soil conditions. And either can be equipped with a heavy-duty dragmat for breaking up cores.

The Ryan Tracaire and Renovaire. One of them is perfectly suited to your grounds.

CUR 2-5763

THE RYAN® TRACAIRE & RENOVAIRE

- ☐ Yes, I'd like a demonstration of the Tracaire.
- ☐ Yes, I'd like a demonstration of the Renovaire.
- ☐ Please send me your 1982 turf-care catalog.

Name

Title

Company

Address

City

State *ZIP*

RYAN®
TURF-CARE EQUIPMENT

2206 Cushman, P.O. Box 82409
Lincoln, NE 68501
For the location of your nearest dealer, call 402-435-7208

© Outboard Marine Corporation, 1981 All rights reserved

WT&T

EVENTS

The current issue of WEEDS TREES & TURF carries meeting dates beginning with the following month. To insure that your event is included, please forward it, 90 days in advance, to: WEEDS TREES & TURF Events, 757 Third Ave., New York, NY 10017.

Arizona Turfgrass Conference, University of Arizona, Tucson, AZ, **May 6-7.** Contact Prof. W.R. Kneebone, University of Arizona, College of Agriculture, Department of Plant Sciences, Tucson, AZ.

Menninger Flowering Tree Conference, Cypress Gardens Quality Inn, Cypress Gardens, FL, **May 20-21.** Contact Dan Wood, Florida Nurserymen & Growers Association, P.O. Box 16796, Temple Terrace, FL 33687, 813/985-8511.

Kentucky Cemetery Association Annual Convention, Executive Inn, Louisville KY. June **June 10-12.** Contact Lewis Tingley, Resthaven Memorial Park, P.O. Box 18068, Louisville, KY 40218, 502/491-5950.

Florida Nurserymen and Growers Association Annual Convention, Doral Country Club, Miami, FL, **June 10-13.** Contact Barbie Derby, FNGA, P.O. Box 16796, Temple Terrace, FL 33687, 813/985-8511.

7th Nebraska Turfgrass Field Day & Equipment Show, Mead Field Lab, Lincoln, NE, **June 15.** Contact Robert Shearman, University of Nebraska, 377 Plant Science Bldg., Lincoln, NE 68583-0724, 402/472-2854.

Virginia Nurserymen's Association/ Virginia Society of Landscape Designers Joint Summer Meeting, Holiday Inn, Richmond, VA, **June 20-22.** Contact Katherine Martin, PO 427, Richmond, VA 23204, 804/644-0912.

Outdoor Power Equipment Institute Annual Meeting, La Costa Hotel and Spa, Carlsbad, CA, **June 20-23.** Contact Dennis Dix, OPEI, 1901 L Street, NW, Suite 700, Washington, DC 20036, 202/296-3484.

American Bonsai Society Symposium 82, University of Maryland/ College Park, **June 24-26.** Contact Tim Sobol, 1226 Woodrow Avenue, Norfolk, VA.

Western Canada Horticultural Trade Show, Pacific National Exhibition Grounds, Vancouver, BC, Canada, **July 12-13.**

American Society of Landscape Architects Southeast Regional Conference, Knoxville Hilton, Knoxville, TN, **July 15-17.** Contact Thomas Main, 3708 Kingston Pike, Knoxville, TN 37919, 615/632-4924.

American Association of Nurserymen Annual Convention, Sheraton Waikiki Hotel, Honolulu, HI, **July 17-21.** Contact Bob Lederer, 202/ 737-4060.

Society of American Florists Annual Convention, Fontainebleau Hotel, Maimi, FL, **July 21-25.** Contact Darryl McEwen, 800/336-4743.

It drives your dirt to drink

...and drain too much or too little water, and you've got problems!... unless you use Aqua-Gro the rootzone water management tool.

Aqua-Gro is specially formulated to eliminate problems from excessive moisture. Its unique blend ensures faster, more uniform water penetration and drainage. Aqua-Gro will provide the desired residual benefits, irrigation after irrigation, because it does not leach. Insufficient moisture can cause localized dry spots and browned out turf.

University of Georgia CES Turf Field Day, Athens, GA, **July 21.** Contact Dr. Gilbert Landry Jr., University of Georgia CES, Department of Agronomy, Athens, GA 30602, 404/542-2692.

American Sod Producers Association 16th Annual convention, Stouffer's Inn, Denver, CO, **July 21-23.** Contact ASPA, 9th and Minnesota, Hastings, NB 68901, 402/463-4683.

Residential Design Short Courses, Scottsdale Country Club, Scottsdale, AZ, **Basic Landscape Design, July 22-24; Landscape Construction Details, July 26-28, Advanced Landscape Drawing, July 30-31.** Contact ALCA, P. O. Box 27312, Tempe, AZ 85282.

Planting Designs Short Course, Ohio Agriculture Research and Development Center, Wooster, OH, **August 2-4.** Contact Fred Buscher, Wooster Area Extension Center, Ohio State University CES, 216/262-8176.

International Society of Arboriculture 58th Annual Conference, Galt House, Louisville, KY, **August 8-11.** Contact E.C. Bundy, ISA, PO 71, Urbana, IL 61801, 217/328-2032.

California Associaton of Nurserymen Convention, El Rancho Hotel, Sacremento, CA, **Sept. 21-23.** Contact Elaine Thompson, CAN, 1419-21 Street, Sacremento, CA 95814, 916/448-2881.

Florida Nursery and Allied Trades Show, Curtis Hixon Convention Center, Tampa, FL, **Sept. 24-26.** Contact Barbie Derby, FNGA, P.O. Box 16796, Temple Terrace, FL 33687, 813/985-8511.

Garden Industry of America Conference & Trade Show, Cincinnati Convention Center, Cincinnati, OH, **Sept. 30-Oct. 2.** Contact Linda Nelson GIA, Box 1092, Minneapolis, MN 55440, 612/374-5200.

Bedding Plants Annual Meeting and Trade Show, Sheraton Towers, Orlando, FL, **Oct. 3-7.** Contact Maria Voigt, Bedding Plants, Inc., P.O. Box 286, Okemos, MI 48864, 517/349-3924.

22nd Annual Southern California Turfgrass/Landscape Exposition, Orange County Fairgrounds, Costa Mesa, CA, **Oct. 6-7.** Contact Ed McNeill, SCTC, 1000 Concha Street, Altadena, CA 91001, 213/798-1715.

2nd National Urban Forestry Association Conference, Cincinnati Convention Center, Cincinnati, OH, **Oct. 10-14.** Contact Richard Pardo, AFA, 1319 Eighteenth Street NW, Washington, DC 20036, 202/467-5810.

Missouri Lawn & Turf Conference, Marriot Jan-tara, Osage, MO, **Oct. 11-13.** Contact John Dunn, 314/882-7511.

Pacific Horticultural Trade Show, Los Angeles Convention Center, Los Angeles, CA, **Oct. 13-15.** Contact Elaine Thompson, CAN, 1419-21st Street, Sacramento, CA 95814, 916/448-2881.

Interior Plantscape Association Fourth Annual Meeting and Trade Show, Portland Marriott, Portland, OR, **Oct. 25-27.** Contact Barry Wood, IPA, 11800 Sunrise Valley Drive, Reston, VA 22091, 703/476-8550.

12th Annual Educational Conference of the National Institute on Parks and Grounds Management, Holiday Inn O'Hare/Kennedy, Rosemont (Chicago), IL, **Oct. 31-Nov. 4.** Contact National Institute, PO 1936, Appleton, WI 54913, 414/733-2301.

Aqua-Gro provides fast relief. Aqua-Gro moves water into the rootzone reducing run-off and evaporation. More uniform water movement and distribution through the soil profile reduces summer stress and watering costs 30%-50%.

In addition, Aqua-Gro enhances the efficacy of pesticides and fertilizers, while eliminating the problems associated with thatch, compaction, and poor soil mixing.

So use Aqua-Gro. Available in liquid concentrate or spreadable granular from your local distributor. It's an important ingredient to insure the constant healthy growth of turf on grounds, playing fields, and golf courses.

For free illustrated brochure and further information call TOLL FREE 800-257-7797

AQUATROLS CORPORATION OF AMERICA, INC.
1432 Union Avenue, Pennsauken, N.J. 08110

AQUA-GRO®

It drives your dirt to drink...and drain.

Circle No. 102 on Reader Inquiry Card

COME GROW WITH US!

We're talking about your growth, not ours.

We're already a nationally known multi-million dollar company. And as we grow we have a strong policy of promoting our people as they become ready for more responsibility. Which means that we're usually looking for a few more good people to join us—and grow.

Right now we're looking for several qualified people who would like to become horticultural specialists on a full or part-time basis. If you have hands-on experience or an education in agronomics, horticulture, forestry, plant pathology or entomology, we'd like to hear from you.

Send your resume and cover letter to Richard Renson, ChemLawn Corporation, 47 Perimeter Center East, N.E., Atlanta, Georgia, 30346. In your cover letter, please let us know in what parts of the U.S. you'd prefer to work.

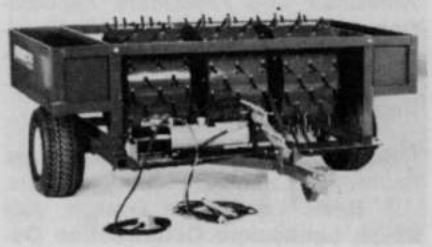
Thank you!

CHEMSCAPE
Tree and Shrub Care Service
of ChemLawn Corporation
Atlanta, GA 30346

Circle No. 108 on Reader Inquiry Card

PRODUCTS *from page 62*

Dedoes Industries has designed a trailer package with an aerator and a hydraulic dump box. Both pieces of equipment can be pulled by most tractors and have remote control hydraulics. The aerator is available in a variety



of tine styles for tees, greens, fairways, lawns or institutional grounds. The dump box has a 1,000-lb. lift capacity and uses the same hydraulics as the aerator.

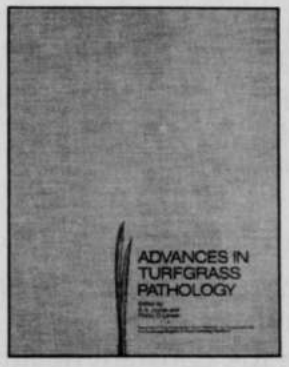
Circle No. 160 on Reader Inquiry Card

Briggs and Stratton has introduced the Magnetron electronic ignition system. Maintenance free, the unit uses a chip designed especially for it. The system is epoxy sealed so oil, moisture, dirt and corrosion do not affect it. A transistor module, with no moving parts replaces the points and condenser. The

Continues on page 72

Advances in Turfgrass Pathology

published by HARCOURT BRACE JOVANOVICH PUBLICATIONS in cooperation with Dr. B. G. Joyner, Dr. P. O. Larsen and Chemlawn Corporation



This extensive volume contains chapters on:

- turfgrass diseases
- cool v.s. warm season pythium blight and other related pythium problems
- snow molds of turfgrasses
- fairy rings
- leaf spot of Kentucky Bluegrass in Minnesota
- initial and filed fungicide screening
- turfgrass disease resistance
- PLUS MUCH MORE!

$27.95* (hardcover)
$18.95* (paperback)

COPIES LIMITED — DON'T DELAY!

ADVANCES IN TURFGRASS PATHOLOGY is a compilation of more than 23 reports and discussions by the nation's leading turfgrass pathologists. Explore the diseases that attack turfgrass. Find out how to conquer the battle of turfgrass diseases.

KEEP CURRENT WITH NEW IDEAS ON HOW TO HANDLE TURFGRASS PROBLEMS WITH ADVANCES IN TURFGRASS PATHOLOGY.

Return this coupon to: Book Sales
Harcourt Brace Jovanovich Publications
One East First Street, Duluth, MN 55802

YES! Please send me _____ copy(ies) of ADVANCES IN TURFGRASS PATHOLOGY.

Name _____
Address _____
City _____ State _____ Zip _____
Phone _____

$27.95* hardcover $18.95* paperback
Quantity rates available on request.

A check or money order for _____ is enclosed.

*Please add $3.00 per order plus $1.00 per additional copy for postage and handling.

Please charge to my Visa, Master Card, or American Express (circle one)
Account Number _____
Expiration Date _____
Please allow 6-8 weeks for delivery. WTT 52

COUNT THE YEARS OF DAVEY TREE EXPERIENCE.

Davey Tree is the world's original tree care specialist. We've been "keeping America green for 73 years."

Davey Tree is also the world's largest tree care specialist. Mainly because we've built a reputation for top quality work at reasonable costs.

This means we can offer you a full range of services for commercial and municipal properties.

Pruning, feeding, insect control, and tree surgery done by highly trained people using specialized equipment.

What's more, other tree companies can't match many of these services:

Our arborists are trained at the Davey Institute of Tree Sciences in Kent, Ohio.

A staff of entomologists, agronomists, and plant pathologists at no additional charge.

Patented ARBOR-GREEN® tree fertilizer with a two-year formula, available only from Davey.

And comprehensive insurance that fully protects our employees as well as public property.

In addition, we offer lawn fertilization and weed control through the Davey Lawnscape Division.

Circle No. 145 on Reader Inquiry Card

Another nice thing. Davey will work with you to help develop budgets, surveys, and specifications for your new or on-going tree care program.

For a free consultation, look us up in the Yellow Pages under "Tree Service." Or write to: Donald J. Shope, VP Tree Care Services, Davey Tree, 117 S. Water St., Kent, Ohio 44240.

Davey Tree. Our 73 years of experience is the one thing you can count on for all your tree care needs.

DAVEY TREE

Kent, Ohio • Coast to Coast and Canada

Keeping America Green Since 1909.

YOU CAN ROUNDUP®

AND, AND!

ALWAYS READ AND FOLLOW LABEL DIRECTIONS FOR ROUNDUP.

Roundup® is a registered trademark of Monsanto Company. © Monsanto Company 1982. RUP-SP2-101

USE

Lots of lawn care jobs you do are easier and faster with Roundup.

Wherever you use it, Roundup® herbicide helps make weed control around your customers' homes fast, easy and effective. Just one application of Roundup controls tough labeled weeds right down to the roots, so they won't grow back. That means less need for time-consuming repeat treatments.

And Roundup has no residual soil activity, so it can't wash or leach from treated areas to injure desirable vegetation.

Whether you apply Roundup with a backpack sprayer or a hand-held wiper, it effectively controls weeds *wherever* they grow. Around shrubs and bushes. In sidewalk cracks. Along driveways. At the base of trees. Along fences. In and around flowering ornamentals. Spot lawn renovation. Edging around obstacles. You name it—there's virtually no limit to the uses of Roundup!

So reach for Roundup before you begin your next lawn care job. It'll help make weed control faster and easier—which can mean more profit for you.

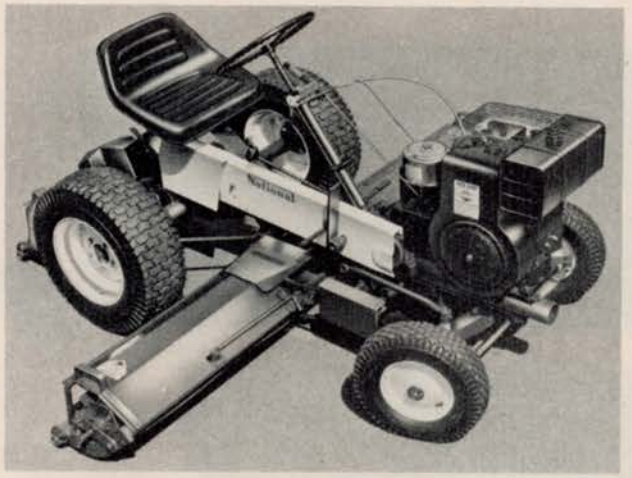
FOR A FREE GUIDE TO ROUNDUP, CALL 1-800-621-5800 TOLL FREE. IN ILLINOIS, CALL 1-800-972-5858.

VERSATILE Roundup Herbicide by Monsanto EFFECTIVE

Monsanto

Circle No. 125 on Reader Inquiry Card

Get the most performance and dependability for your money!



Today, when purchase price, fuel economy and longevity are most important, count on a National to do more work than competitive machines, and do it with easier, faster and less maintenance, over a longer period.

- **National's initial cost is less** than that of mowers sold to do the same job.
- **Less down time.** Standard off-the-shelf items like belts and bearings which are available from any local industrial supplier.
- **Greater fuel economy.** 44% to 62% less fuel consumption than power robbing, hydrostatic type rotary mowers.
- **One-third to one-half the cost** of maintaining a National versus competitive models because of its easy accessibility.
- **Model 84 gets the job done faster** by cutting a swath a foot wider than a rotary.
- **Quality construction.** More years of service. For example, we still cut our own gears out of solid, quality steel blanks.

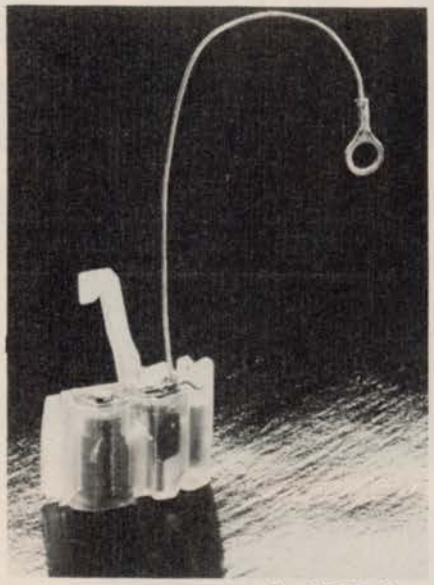
Write for the name of your nearest dealer—then call for a demonstration.

Building functional quality mowers since 1919

NATIONAL MOWER COMPANY
660 Raymond Avenue
St. Paul, MN 55114
612/646-4079

Circle No. 128 on Reader Inquiry Card

PRODUCTS *from page 66*



system appears now on the I/C (industrial/commercial) engines 3, 5, 8, 9, 10 and 16 hp single cylinder and 16 and 1-8 hp twin cylinder cast iron bore engines.

Circle No. 161 on Reader Inquiry Card

Hinde Engineering now offers the Air-Aqua Root Irrigation system which can save over half the water and fertilizer conventionally needed. This tubing can be placed in close contact with the plant roots without fear of it clogging or deteriorating and emits water equally along its length. When the pressure is turned off, the valves automatically close to block out dirt, roots and insects. The chemically inert polyethylene tubing is unaffected by salts, soil, and environmental factors.

Circle No. 162 on Reader Inquiry Card

Hahn's precision oscillating action spreader unit mounts directly to the frame of the Hahn Spray-Pro and is powered by its engine. The swath is

adjustible from 12 to 45 feet and the micrometer type setting provides a uniform rate of flow. The unit spreads 3000 sq. ft. in 2 minutes and is suitable for seed lime, or fertilizer.

Circle No. 163 on Reader Inquiry Card

"That's a polite term for letting the capital plan go to hell." There is no one at Rec-Park to manage Candlestick the way Ray Ward operates the Oakland Coliseum. George Kerwin supervises maintenance but has no voice in policy-making. "We need a guy to stay on top of things and make sure they get done," a Giants' official said.

The Candlestick leases specify that maintenance of the playing field is the Giants' responsibility during the baseball season but the City's during the football season. This clumsy system has not worked.

Back in 1979 after the Giants had lost the fight to return to astroturf, the Giants suggested that an outside consultant be brought in to help direct the turf maintenance. Coincidentally, it took a play-off bound team (49ers) and the NFL to put the advice to work almost three years later. For the play-off games, the center of the field was stripped of all Kentucky bluegrass turf and replaced with clay grown sod containing Kikuyugrass obtained from a city park. With George Toma from Kansas City supervising the operation, the field was in acceptable condition for the games. But the main problem is still evident—continuality of field maintenance and one overall knowledgeable supervisor.

Analyses and Solutions

Before one can offer solutions to the Candlestick Park situation, perhaps the following questions should be addressed:

1 - Who or why didn't someone within the City of San Francisco attempt to find out what was going on and make some overt attempt to resolve it?

2 - If the field failed to function as originally designed, why wasn't someone in the city asking questions or seeking help?

3 - Why weren't the field maintenance problems recognized before they developed or certainly before they got out of hand where they could not be resolved by local officials?

4 - Why wasn't the firm who designed and constructed the Sportsturf TD Field, who had offered technical and agronomic assistance repeatedly, been contacted or approached for solutions?

There is nothing wrong with the design or the construction of the turfgrass field in Candlestick Park. The problem stems from the lack of employing the "sophisticated turf manager" alluded to earlier in this article. Someone needs to oversee and manage the field on a year-around basis and must employ the current knowledge and cultural practices available to him. The San Francisco Giants and 49ers must initiate a cooperative effort to communicate about what the other is doing and then combine this information into a yearly maintenance program and schedule. Such a solution will work as evidenced by the cooperation, hard work and dedication the City of San Francisco and their personnel gave to George Toma during the NFL play-off games. **WTT**

Hopkins

NEW REVENGE™

cost effective control of

Johnsongrass, Bermuda, other grasses

1. **Quick brownout.** Kills entire plant — roots and all — ends regrowth problems.
2. **Economical, easy to use.** Free-flowing. Completely water soluble, forms a true solution.
3. **Up to 98% control** of rhizome johnsongrass into the next season—even where foliar materials alone fail to give good control.

REVENGE is a highly effective, low-cost herbicide for control of established annual and perennial grasses. It combines contact action with systemic action that moves chemicals through foliage *and roots.* Short soil residual permits replanting within a few months.

REVENGE used at 15 pounds per 100 gallons of water, along with 2 quarts of Hopkins' Neptune® or Agicide® Activator, gives fast, effective control of troublesome perennial grasses such as quackgrass, bermudagrass, johnsongrass and cattails. Don't just get mad at grass problems — get REVENGE.

For nearest distributor, contact:

Hopkins agricultural chemical co.

BOX 7532 • MADISON, WISCONSIN 53707 U.S.A.

H-R-50R

Circle No. 117 on Reader Inquiry Card

WT&T CLASSIFIEDS

RATES: 75 cents per word (minimum charge, $20). Bold face words or words in all capital letters charged at $1.00 per word. Boxed or display ads charged at $70 per column inch (one inch minimum). Agency commissions will be given only when camera-ready art is provided by agency. For ads using blind box number, add $5 to total cost of ad. Send ad copy with payment to Dawn Anderson, WEEDS, TREES & TURF, 1 East First Street, Duluth, MN 55802.

BOX NUMBER REPLIES: Mail Box number replies to: WEEDS, TREES & TURF, Classified Ad Department, 120 W. 2nd St., Duluth, MN 55802. Please include box number in address.

BUSINESS OPPORTUNITIES

WANT TO BUY OR SELL a golf course? Exclusively golf course transactions and appraisals. Ask for our catalog. McKay Golf and Country Club Properties, 15553 N. East Street, Lansing, Michigan 48906. Phone (517) 484-7726. TF

START YOUR OWN SOIL TESTING SERVICE. High Profits—Easy to get started. Takes the guess work out of Professional Turf Care Management. Unlike the amateur N-P-K/pH test like the homeowners use. This is a thorough 14-Point Professional Laboratory Analysis with recommendations by certified Turf and Soil Experts. It's what you need to set you apart from your competitors. Makes you the Pro—Keeps your customers loyal. A $23 analysis for just $10.50. A fifty dollar deposit gets you set-up with all the materials you need to market and service your customers and future prospects. We do the work—You come out ahead! Green Pro Cooperative Services, 380 S. Franklin Street, Hempstead, NY 11550. (516) 483-0100. 5/82

FOR SALE

FOR SALE: Reclamation Business: Finn Mulcher with asphalt attachments and all equipment (tractor, trucks, & implements) for further details call: (901) 364-3062. Dresden, TN. 5/82

SKYWORKER AERIAL BUCKETS: Sales, Parts and Service. New and used units available to 65 feet. New and Used brush chippers, Hydro Ax's, used stumpers, sprayers and digger derricks also available. Call or write P.C. GOULD SALES COMPANY, Plains Road, Essex, Conn. 06426. (203) 767-1636. 6/82

SPRAYERS—FACTORY DIRECT. Professional gardeners, turf applicators, proven dependability, unconditionally guaranteed. Black River Sprayers, Dept. 1-A, P.O. Box 11, Long Beach, NC 28461. 6/82

Northern grown pure Meyer Zoysia (Z-52) your future great water and $ saving turf—Guaranteed Bermuda & bug free—"Beauty Lawn Sod" (Cincinnati) (513) 424-5722. 8/82

FOR SALE—SOD FARM—WISCONSIN—LEASE OR SALE. WRITE WTT Box 294. 5/82

PESTICIDE HANDBOOK (ENTOMA)—Contains trade names, uses, active ingredients, manufacturers and suppliers of over 4,000 commercial pest control products. Includes updated directories of key EPA, extension, and IR4 personnel; poison control centers; suspended and cancelled pesticides; new chemical registrations; and much, much more! Send $17.00 per copy to: **ENTOMOLOGICAL SOCIETY OF AMERICA**, WTT, Box 4104, Hyattsville, MD 20781. 5/82

Completely overhauled and dielectrically insulated 45' Sky-Workers—For Sale and Rent. 90 day guarantee on sales. Call Aerial Lift, Inc., Milford, Conn. (203) 878-0694. TF

For Sale—Lawn and tree spray business in Sarasota/Bradenton, Florida. Well established—25 years old with regular established accounts. Heavily populated area. Spray equipment included. Price $45,000. Please call (813) 753-1795 (days) or (813) 753-1864 (evenings). 5/82

LAWN SEED. Wholesale. Full line of top quality grasses. Improved bluegrass varieties, fine fescues and fine bladed ryegrasses. We specialize in custom mixing. Oliger Seed Company, 2705 Wingate Avenue, Akron, Ohio 44314. Call collect (216) 753-2259. 4/83

FOR SALE—9-Hole, Par 3 golf course in Eastern Mass. (Southboro) 1300 yards, well landscaped, excellent greens, 12 yrs. old, mowed tee to green, flat, 1300 rounds 1981. Must retire. Heavily populated area. E.L. Kallander, 18 Meadow Lane, Southboro, MA 01772. (617) 485-3834. 6/82

SOD-GRASS-SPRIGS Hy Bermuda 419 & 328—$1.10/sq. yd., Meyer Z-52 Zoysia—$2.25/sq. yd., Centipede—$1.50/sq. yd., Sprig prices quoted—ship anywhere Bayou Pierre Turf Farms, Carpenter, MS 39050. (601) 885-8281 or 956-5034. TF

USED EQUIPMENT

USED GOLF CARS FOR SALE—All makes and models, 3 & 4 wheel, electric or gas. If we don't have your choice in stock we can get it. Transportation available. Mid-Atlantic Equipment Corp., Collegeville, PA. Call Now! (215) 489-1400. TF

HI-RANGER BUCKET TRUCKS, 54' and 51', Flatbed and chip box mitts—Merrill brush chipper. Allied Enterprises, Inc., W. 204 N. 11509 Goldendale Rd., Germantown, WI 53022, (414) 255-6161 anytime. TF

For Sale—2500 Gallon Diesel Hydroseeder. Mounted on 1973 Mack R-600 twin screw with new paint, tires and fenders. Excellent condition. Ready for work. $15,000.00. Call (912) 488-2388. 5/82

FOR SALE: 1980 Bowie Hydro-Mulcher. Windsor 1000. Excellent condition. Will consider delivery. $12,500.00. Maintain, Inc., P.O. Box 1711, Beaverton, OR 97075. (503) 642-2574. 5/82

STUMP GRINDER—Vermeer model 630 w/4 cyl. Wisc. engine, low hours. Good condition. For sale or trade for used 16" brush chipper. Contact Arborist Tree Service (312) 948-7280 (Deerfield, Ill.). 5/82

Used Spray Units For Sale

1,250-gallon stainless steel tanks. Mechanical agitation. FMC 20 gallon/minute pump. Hanney electric reel. Ford F600 and Chevy C60's—'76's, '77's, '78's and '79's.

Call (502) 241-7341. TF

CARETREE 40" Spade on SWINGER 200 4 wheel drive loader, like new, 500 hours, w/Bucket & Forks, very fast for B&B, $22,500., Tandem Axle trailer for same, $2,000., VERMEER TS-66 low hour Spade, Good Condition, $15,000. TREES INC., Box 1334, Bismarck, N. Dak. 58502. PHONE: (701) 223-3225. 5/82

HI-RANGERS AERIAL BASKETS 65', 57', and 53'. Skyworkers aerial baskets 65', 50', 40'. Vermeer stump cutter 1560,6. Vermeer tree spade 66, TS 44. Asplundh bucket and brush chippers, Bean sprayer, 9 ton trailer. Parkway Tree Service, 12026 W. Cherry, Wauwatosa, Wisc. 53226. (414) 257-1555. TF

SPRAY TRUCKS—1973 Ford F600. V-8, 4 speed 59,000 miles. 600 and 200 gallon fiberglass tanks. Bean Royal 55 pump. 2 electric Haney Reels. Gasoline or propane fuel. Excellent condition. 1953 GMC. 6 cylinder, 5 speed. 8600 miles. 1200 gallon fiberglass tank. Bean Royal 70 pump. 2 electric Bean Reels. Excellent condition. (616) 676-1781. 5/82

FOR SALE—3 gang Toro Spartan mower & frame, rubber tires, new. No reasonable offer refused. Call (308) 262-1537. 5/82

EQUIPMENT FOR SALE Spray truck, flat-bed truck which dumps, Case tractor, International Skyworker bucket truck, chipper, Meyers field-sprayer, chipping truck with box that dumps. Call (616) 676-1781. 5/82

Asplundh and **Hi-Ranger** forestry bucket trucks, Asplundh wood chippers, Vermeer stump grinder 2460A. Excellent Condition! Log splitters. Mirk, Incorporated, (216) 669-3567. Residence, (216) 669-3562. 7629 Chippewa Road, Orrville, OH 44667. 5/82

HELP WANTED

Leading commercial flail mower manufacturer has job openings for direct factory Territory Managers. Travel for Sales and Service with demonstration promotion of our equipment is required. Salary, profit sharing, car and travel expenses. Relocation may be necessary. Send resume to WTT Box 288. 5/82

PARK ARBORIST: St. Louis County, Missouri. Responsible for directing and operations of the forestry, nursery and greenhouse crews in a parks system consisting of 66 parks totaling 11,950 acres. Applicants should have Bachelor's Degree in Forestry, Horticulture or related field, and considerable experience in forestry, nursery, and greenhouse operations. Salary Range $19,344-25,920. Apply to St. Louis County Division of Personnel, 41 S. Central, Clayton, Missouri 63105, telephone (314) 889-2429. **EQUAL OPPORTUNITY EMPLOYER M/F** 5/82

ARBORIST
Tampa, Florida

The Tampa Parks Department is seeking a progressive, management-oriented individual to formulate and implement a city-wide tree maintenance management program. Requirements include Bachelor's degree in Arboriculture, Urban Forestry, Ornamental Horticulture or related field, and reasonable experience in the selection, care and treatment of trees.

We offer a salary range of $15,496-$19,448 and an excellent benefits program. Please apply by 5/28/82 to:

City of Tampa Personnel
306 E. Jackson St.
Tampa, Florida 33602
equal opportunity employer m/f

REGIONAL MANAGER—Manufacturer of irrigation products looking for individual to handle sales responsibilities for the state of Florida. Individual must be familiar with distributors, contractors, and architects. Send resume of qualifications along with salary history to WTT Box 293. 5/82

LANDSCAPE ARCHITECTURE/SALES: Houston design build firm seeking people experienced in both design & sales. Excellent salary opportunities & benefits. Send resume & salary history to Paul Holsinger, L.D.C. Houston, Inc., Rt. 2, Box 160-E, Richmond, Texas 77469. 7/82

Large Midwest Sod Farm has openings for Harvest Foreman, Assistant Foreman for Sod Production and Maintenance as well as an opening for a mechanic with an agricultural background. Only enthusiastic, experienced individuals with leadership qualities need apply. Send resume to WTT Box 291. 5/82

LANDSCAPE DESIGNER-SALESMAN. Established, growing firm in southern New York engaged in residential and commercial design and installation, seeking aggressive, proven salesman. Experience necessary. Send resume, salary history to: Shade & Sun Nursery, Inc., Route 52, Stormville, NY 12582. 6/82

PARK & RECREATION SUPERINTENDENT The City of Holland, Michigan has a new position open for a top administrative person in a combined Park & Recreation Department. Seeking applicants with degree and/or management experience in both areas. Salary range $22,350 to $28,142—plus benefits. Send resume to Personnel Officer, City Hall, Holland, MI 49423. An Equal Opportunity Employer. M/F 5/82

MISCELLANEOUS

NEW BALL BARRIER NETTING: Made of Olefin fibers. 6½ feet and 25 feet high. Strong and tough. Will not rust. Easy to handle. For Driving Ranges and Golf Courses. Keep golf balls from straying off-course. J.A. Cissel Co., Inc., Dept. JK, P.O. Box 339, Farmingdale, N.J. 07727. (800) 631-2234. 3/82

START YOUR LANDSCAPING CAREER NOW! Write: School of Landscape Design and Sales, Lake City Community College, Rt. 7, Box 42, Lake City, Florida 32055. Fully accredited and V.A. approved. 3/83

LANDSCAPE AND TURFGRASS MANAGEMENT: Obtain the expertise to start and/or manage a landscaping or lawn care business. For information on our two year program contact the Institute of Applied Agriculture, University of Maryland, College Park, Maryland 20742 (301) 454-3938. 4/83

DIESEL HI-RANGER TOWERS—48-100 Feet working heights. Daily, weekly, monthly rentals with or without operator. MATLOCK LEASING, Pottstown, PA (215) 326-7711. 12/82

POSITION WANTED

Golf Professional/Superintendent with fifteen years extensive experience in golf business seeking professional/superintendent and/or professional/manager position. Energetic, responsible and innovative individual with complete knowledge and working experience in professional, manager and superintendent fields. Capable of directing all golf course operations. Moderate salary package accepted for right position. Please reply to WTT Box 292. 5/82

FOR RENT

FOR RENT—78" & 44" Tree Spades for hire. Richard C. May Tree Service, Inc. (609) 234-2696 or (609) 261-4227. 5/82

Classified Advertising is
- **Easy**
- **Effective**
- **Economical**

send a classified advertising message...
...write here.

(Please Print)_____

_____

_____

_____

1. Number of insertions: (circle) 1 2 3 6 12 TF (Til Forbid)
2. Start with (month) _____ issue (Copy must be in by 1st of month preceding)
3. Amount enclosed: $_____ .

PAYMENT MUST ACCOMPANY ORDER.

SIGNATURE _____ DATE_____

NAME _____ COMPANY _____

STREET _____

CITY _____ STATE_____ ZIP_____

PHONE NUMBER _____

MAIL AD COPY TO: DAWN ANDERSON, WEEDS TREES & TURF, 1 EAST FIRST STREET, DULUTH, MN 55802

RATES: 75¢ per word (minimum charge $20.00) boldface words or words in all capital letters charged at $1.00 per word. Boxed or display ads charged at $70 per inch (one inch minimum). For ads using blind box number, add $5 to total cost of ad.

ADVERTISERS

Reader Inquiry No.		Page No.
139	Agricultural Products/3M	8, 11
101	The Andersons	51
102	Aquatrols Corp. of America	64, 65
103	Atwater Strong Division	62
104	Barebo, Inc.	11
105	BFC Chemicals, Inc.	27
106	Brouwer Turf Equip. Ltd.	15
107	Bunton Company	29
108	ChemScape Corporation	66
109	Chevron Chemical Co.	41
110	Ciba-Geigy Corporation	3
111	Cushman Turf	32,33
145	Davey Trees	69
112	Deere & Co., John	31
113	Diamond Shamrock/ Ag Chem Div.	46,47
114	Dow Chemical Co. U.S.A.	Cover 2, 1
116	Hoffco, Inc.	62
117	Hopkins Agri. Chem Co.	73
118	Hypro	60
119	Irritrol-Trol Mfg.	5
120	Kut-Kwick	Cover 3
121	Lofts Seed, Inc.	Cover 4
122	Mathews Company	58
123	Mitsubishi Agricultural	25
124	Mobay Chemical Corp.	52, 53
125	Monsanto Company	70, 71
126	Mott Corporation	59
127	National Car Rental	58
128	National Mower Company	72
129	Northrup King Co.	13
130	Olin	61
131	Oregon Fine Fescue Comm.	28
132	Prentiss Drug & Chemical Co., Inc.	76
133	Rain Bird Sales, Inc.	42, 43
134	Ransomes, Inc.	21
135	Rhone Poulenc, Inc.	22, 23
136	Ryan Turf	63
137	Solo Incorporated	40
146	Stauffer Chemical	17
138	Tee-2-Green Corp.	7
140	Toro Company	19
141	Toro Irrigation Division	55
142	Union Carbide	56, 57
143	Vermeer Mfg. Company	49
144	Weather-matic, Inc.	45

prentox® Diazinon®
Turf and Ornamental Care Products.
NOW!
A complete line of Diazinon® products—Emulsifiable Concentrates, Granules or Wettable Powder—with complete labeling for turf and ornamental insect control, available through more than 40 distributors nationwide. Call or write for the distributor nearest you.
prentiss
Drug & Chemical Co. Inc.
363 Seventh Avenue New York, N.Y. 10001 (212) 736-6766
P.O. Box 701 Park Ridge, Ill. 60068 (312) 825-0020
P.O. Box 12433 Fort Worth, Texas 76116 (817) 738-6042
3609 Shallowford Road Atlanta, Ga. 30340 (404) 458-1055
Prentox®—Registered, Prentiss Drug & Chemical Co., Inc.
Diazinon® Registered, Ciba-Geigy Corporation
PLCAA
NATIONAL PEST CONTROL ASSOCIATION

NEW PRODUCTS

Reader Inquiry No.		Page No.
148	Excel	58
149	King Brothers	58
150	Midmark Corp.	58
151	Bermuda King	58
152	Racal Airstream	60
153	F.D. Kees	60
154	Vandermolen	60
155	Foresight Ind.	60
156	Kut-Kwick Corp.	62
157	Toro Co.	62
158	Deer-Away	62
159	Ditch Witch	62
160	Dedoes Ind.	66
161	Briggs and Stratton	66
162	Hinde Engineering	72
163	Hahn's Spray-Pro	72

This Index is furnished for the readers' convenience. However, the publisher can not guarantee its accuracy due to circumstances beyond our control.

Nursery Marketing Council

Circle No. 132 on Reader Inquiry Card

Tough mowers... from rough cut to smooth finish.

Built for the commercial user, to assure lowest operational cost through efficient design, low fuel consumption, low maintenance, and long life. Built to take the hard usage of the commercial mower operator and the environment in which the commercial mower functions.

kut-kwick

Brunswick, Georgia 31520
Telephone 912/265-1630

Circle No. 120 on Reader Inquiry Card

The Palmer Overseeding Method

Arnold Palmer and Jim Ellison, Bay Hill's Superintendent, are very careful when choosing an overseeding mixture. Some of the world's top golfers have played at Bay Hill in Orlando, and they've come to expect certain standards.

To help maintain the Bay Hill image, Palmer and Ellison use Marvelgreen. And so do some other prestigious courses:

- Fairfield Harbor Country Club, NC
- Hounds Lake Golf Course, SC
- Port Royal Golf Course, SC
- Augusta Country Club, GA
- Jekyll Island Golf Course, GA
- Marshwood at the Landings, GA
- Amelia Island Plantation Golf Course, FL
- Killearn Estates Golf Course, FL
- St. Andrews of the Gulf, MS
- Eden Isle Country Club, LA

Marvelgreen is also being used at the TPA TOUR Tournament Players Club, Ponte Vedra Beach, FL, Allan MacCurrach, Agronomist; Dave Postlethwait, Superintendent.

TPA TOUR

Marvelgreen is a product of Lofts Seed Inc. and Great Western Seed Co., Inc., distributed through:

Sunbelt Seeds Inc.
Tucker GA 30084 ● (404) 491-1311

Circle No. 121 on Reader Inquiry Card

Lofts/Maryland
Beltsville, MD
(301) 937-9292

Great Western Seed Co., Inc.
Albany, OR
(503) 926-5892

Richmond Power & Equipment
Richmond, VA
(804) 353-3845

Anderson Chemical & Turf Supply
Westminster, CA
(714) 897-0202

Valley Seeds, Inc.
Phoenix, AZ
(602) 257-1223

Harpool Seed Company
Denton, TX
(817) 387-0545

Watson Distributing Co.
Dallas, TX
(214) 630-2222
Houston, TX
(713) 771-5771
San Antonio, TX
(512) 654-7065